AUG 2 1 1967

M I N U T E S

of the

MEETING OF THE S-9 TECHNICAL COMMITTEE

"NEW PLANTS"

The Introduction, Multiplication, and Evaluation of New Plants for Agricultural and Industrial Uses and the Preservation of Valuable Germplasm

Texas A&M University
College Station, Texas

July 18-19, 1967

AGENDA
S-9 TECHNICAL COMMITTEE MEETING
College Station, Texas
July 18-19, 1967

1. Registration

2. Roll Call

3. Introduction of visitors

4. Welcome

5. Additions to and approval of agenda

6. Appointment of committees

   (a) Nominating
   (b) Time and place of next meeting
   (c) Resolutions

7. Regional Station report

8. State reports

Alabama	North Carolina
Arkansas	Oklahoma
Florida	Puerto Rico
Georgia	South Carolina
Kentucky	Tennessee
Louisiana	Texas
Mississippi	Virginia

9. Federal reports

   Soil Conservation Service
   Utilization Research and Development Division
   New Crops Research Branch
   Cooperative States Research Service

10. Administrative Advisor

11. Status of project outline and supporting projects

12. Plans for new crops research in 1968. (Sub-committee for industrial crops)

13. Requests for new plant explorations - domestic and foreign

14. Regional publications

15. Committee reports

16. Tour of S-9 work at Texas A&M University

Call to Order and Introduction

The meeting of the S-9 Technical Committee was called to order by Dr. H. W. Bennett, Chairman, at 8:00 am, July 18, 1967. Dr. W. T. Fike was appointed Acting Secretary for the meeting replacing Dr. R. S. Matlock who was out of the country. Each person introduced himself. Those in attendance were:

S-9 Committee Members

R. L. Lovvorn	Administrative Advisor North Carolina
W. R. Langford	Regional Coordinator, Georgia
C. S. Hoveland	Alabama
J. L. Bowers	Arkansas
G. B. Killinger	Florida
George Tereshkovich	Georgia
N. L. Taylor (absent)	Kentucky
R. E. McDonald	Louisiana
H. W. Bennett	Mississippi
W. T. Fike	North Carolina
R. M. Oswalt	Oklahoma
J. Velez Fortuno	Puerto Rico
J. A. Martin	South Carolina
W. E. Roever	Tennessee
E. L. Whiteley	Texas
T. J. Smith (absent)	Virginia
A. J. Laustalot	Cooperative State Research Service Washington, D. C.
A. J. Oakes	New Crops Research Branch ARS, Beltsville, Maryland
G. A. White	" " "
I. A. Wolff	Northern Utilization Research and Development Division, ARS, Peoria, Illinois
W. C. Young	Soil Conservation Service Fort Worth, Texas

Visitors

V. E. Schember	Assistant Director, Texas A&M
M. E. Bloodworth	Texas A&M
Gene Bolton	Texas A&M
M. L. Kinman	Texas A&M
R. D. Lewis	Texas A&M (Retired)
W. G. McCully	Texas A&M
D. R. Paterson	Texas A&M
B. A. Perry	Texas A&M
R. G. Reeves	Texas A&M (Retired)
F. D. Wilson	Texas A&M
Arnold Davis	SCS, Fort Worth, Texas

Welcome

Director Schember welcomed the group the the Texas A&M University. Dr. Bloodworth made the facilities and personnel of the Department of Soil and Crop Sciences available to the group.

Minutes and agenda

The minutes of the 1966 meeting at Experiment, Georgia were approved and the agenda shown on page 1 was adopted for the 1967 meeting.

Appointment of Committees

The following committees were named by Chairman H. W. Bennett:

Nominating Committee

J. A. Martin, Chm.
J. L. Bowers
I. A. Wolff

Resolutions Committee

G. B. Killinger, Chm.
J. Velez Fortuno
W. E. Roever

Time and Place of Next Meeting

E. L. Whiteley, Chm.
C. S. Hoveland
W. C. Young

State and Federal Agency Reports

Committee members presented reports on "New Plants" research in the following order. These reports are appended hereto as Appendix B:

Regional Station	
Alabama	W. R. Langford
Arkansas	C. S. Hoveland
Florida	J. L. Bowers
Georgia	G. B. Killinger
Louisiana	George Tereshkovich
Mississippi	R. E. McDonald
North Carolina	H. W. Bennett
Oklahoma	W. T. Fike
	R. M. Oswalt

Puerto Rico	J. Velez Fortuno
South Carolina	J. A. Martin
Tennessee	W. E. Roever
Texas	E. L. Whiteley

(No reports received from Kentucky and Virginia)

Soil Conservation Service	W. C. Young
Utilization Research and Development Division	I. A. Wolff
New Crops Research Branch	A. J. Oakes
	G. A. White

Dinner and Evening Program

The group met at a dutch dinner at the Ramada Inn which was followed by an interesting and informative talk by Dr. R. D. Lewis concerning his administrative duties in Syria, Dominican Republic and Korea. The group was also honored to have Mesdames Bennett, Lewis, and Whiteley present for this program.

Cooperative State Research Service

Dr. D.Y. Perkins, formerly associated with our group, is now head of the Horticulture Department at Auburn University. Dr. Laustalot subbing for Dr. Clark Harris, new CSRS representative on S-9 Committee, discussed Washington "Hi Lites".

A study was just completed by a joint committee of USDA and State Experiment Station representatives, entitled "National Program for Research and Agriculture". It is an inventory of research projected over the next ten years. It was two and one half years in the making and will be an excellent reference for funding purposes in the future.

New Hatch fund appropriations should show an increase of between $4.5 million (House version) and $7.0 million (Senate version). "If each of us does not receive a slice of the pie remember how it is divided - 50 states 10 departments per school and ten to forty projects per department". (Dr. Lovvorn)

CRIS (Current Research Information Service) goes into effect soon. Form 20 will give background information for this work. More thought will have to be put into the preparation of each Form 20 in future years. This service will be free to persons in no great hurry but a slight charge will be made on rush service.

The Office of Science and Technology is starting two programs pertaining to the quality and beauty of the environment.

1. Beautification of the landscape

2. Preservation of the quality of the environment - air, water and soil pollution.

Administrative Advisor

Dr. Lovvorn commented on several subjects pertaining to S-9:

a. Group as a whole happy that Dr. R. D. Lewis, past Administrative Advisor, could attend and talk to the group.

b. Welcomed Drs. Bowers and McDonald as new State Representatives and Dr. J. Velez Fortuno as a former representative who is again active.

c. The S-9 project has been revised and has been approved by CSRS. Regional programs were evaluated for regional significance and S-9 scored well and congratulations are in order to Bob Langford and his group.

d. Contributing projects from Alabama, Mississippi and Virginia are lacking at the present and these states, even though they participate at S-9 meetings, are welcome to join us with contributing projects.

e. Advice in dealing with your director -- take it on yourself to talk to him concerning this S-9 meeting and have him visit your research plots with you. Help him to help S-9.

f. Reiterated Dr. Laustalot's comments on long range planning reports. It is truly a joint effort and will be very beneficial in funding programs. An 86% increase in man years for agricultural research is expected in the next 10 years. A meeting will be held later this week with ESCOP and USDA jointly recommending the implementation of this report in regards to facilities.

g. The President's Panel on World Food Needs has just released a two-volume report on "The World Food Problem". Optimistic future with increase in facilities but population projections are enough to scare one. These are excellent references on the pros and cons of preventing world hunger.

Status of Project Outline and Supporting Projects

Bob Langford commented on the revised project outline in that "Urban-Rural Uses" was added to the title. The revised project is found as Appendix C. All states whose project titles do not correspond with the revised S-9 project are to change titles on Form 20.

Plans for New Crops Research in 1968

a. The sub-committee for industrial crops consisting of Fike and Whiteley meeting with White, Wolff, Langford and Oakes present the following report to the S-9 Technical Committee.

b. Seed of the following crop species selected for their outstanding oil composition will be made available to all S-9 personnel for testing in their respective states.

1) Hydroxylated fatty acids

   Lesquerella spp. - Twenty lines of twelve species

2) Erucic acid - Lines other than Crambe with erucic acid composition above 50%.

Brassica spp. - Five species

3) Petroselinic acid - approximately 12 umbelliferae species that are recommended for testing based on agronomic traits and high content of petroselinic acid as ascertained by chemical analysis.

4) Substitute for coconut oil

Cuphea sp.

c. It is recommended that uniform test procedures be circulated to all S-9 members concerning each of these crop species and that cooperators follow these procedures wherever possible.

d. The North Carolina and Texas representatives volunteered their facilities for the screening of all available kenaf lines for resistance to root knot nematodes.

e. It is hoped that the evaluation of Tephrosia vogelii lines will be continued and that sufficient seed will be obtained for these tests.

f. Efforts should be made by all cooperators to report their results to Drs. White and Langford prior to December 15 to facilitate preparation of the S-9 Annual Report and to allow for adequate planning for the next year's field studies.

Requests for New Plant Explorations

a. Dr. Tereshkovich presented a proposal to the committee entitled "Domestic Collection of Peach Rootstocks". This was a cooperative proposal between Georgia and South Carolina and appears as Appendix D.

The proposal was given favorable comment by all present, however, Dr. Oakes stated that the blueberry exploration is being funded $1500 yearly and will run until July 1969. The New Crops Branch can not support new requests for domestic explorations until the blueberry project is completed. It was also felt that the $3000 annual cost was somewhat excessive.

Since all agreed that this proposed project was an urgent request for funds a motion was made by Whiteley, seconded by Bowers, and passed that: "The S-9 Regional Technical Committee approves thia project subject to funding by the New Crops Research Branch".

b. Plant needs by states and proposed explorations were discussed. Dr. Lovvorn stated that it was our responsibility as State Representatives to inform our station personnel of proposed explorations and to keep abreast of their individual needs.

c. Specific plant materials requested from forthcoming explorations to Russia and Ethiopia are summarized in Appendix A.

Regional Publication

The regional bulletin "New Plants for the South - A Six Year Progress Report" was discussed. This bulletin will be written by Drs. Langford and Bennett. All committee members are to get their crop variety information to Bob Langford by September 15. Pictures are most welcome.

Committee Reports

a. The presentation of Dr. Hoveland for Chairman and Dr. Tereshkovich for Secretary was made by the Nominating Committee. Dr. Hoveland declined as he will be in South America during the summer of 1968. Dr. Killinger was then presented as Chairman by the committee. A motion was made by Dr. Whiteley, seconded by Dr. Wolff and passed that: Dr. Killinger and Dr. Tereshkovich will guide us during 1967-68.

b. Dr. Whiteley presented his committee's report concerning the date and place of our 1968 meeting.

A motion was then made by Dr. Fike, seconded by Dr. Fortuno and passed that the next meeting of the S-9 Technical Committee be held at Mississippi State University during the mid week of July 1968, beginning on a Tuesday.

Dr. Fortuno issued an invitation for the 1969 Technical Committee Meeting to meet in Puerto Rico. It was moved by Dr. Killinger, seconded by Dr. Hoveland and passed that we accept this invitation for 1969 with the date open.

c. The following resolutions presented by Dr. Killinger, Chairman of the Resolutions Committee, were adopted unanimously.

Be it resolved that the Technical Committee members attending the Regional Project S-9 "New Plants" July 18-19, 1967 at College Station, Texas express their sincere thanks to Dr. Eli Whiteley and the Administration of Texas A&M University for inviting this committee to meet at his station in lieu of the originally planned Arkansas meeting. His excellent arrangements at the Ramada Inn and in meeting committee members at the airport, the Tuesday night dinner arrangements and Dr. R. D. Lewis' travelogue and timely comments are deeply appreciated.

Be it further resolved to thank Dr. Bloodworth and Assistant Director V. E. Schember for their welcome of the S-9 Committee.

Further thanks are due Mr. Bolton in assisting Dr. Whiteley as well as other Texas A&M staff.

Finally, the powers that be have our appreciation for the excellent weather experienced during the meeting.

Miscellaneous

Dr. Bennett read a letter of invitation for S-9 participation in the NC-7 meeting to be held September 6 and 7 at the University of Minnesota at St. Paul.

It was moved by Whiteley, seconded by Fike that Dr. Hoveland represent S-9 at this meeting. The motion passed.

Drs. Oakes and Laustalot commented that this should be done and is being done with regions other than NC-7, namely W-6 and NE-9. The Chairman of the Climatology groups meet with each of the other groups at their regular meetings which offers much for the continuity of the programs.

It was moved by Killinger, seconded by Hoveland and passed that representatives from other regions be invited to all future S-9 regional meetings.

The meeting was adjourned July 19, 1967 at 10:30 am.

Tour of Texas A&M Research Plots

A morning tour to the kenaf variety plots of Dr. Wilson was very interesting and worthwhile.

An afternoon trip was made to the 60-acre experimental planting of kenaf in the Brazos River bottom. The plants were from 6-7 feet tall and impressed those who went on the tour.

APPENDIX A

New Plant Materials Requested by Research Workers in the Southern Region

New Plant Materials requested by
Research Workers in the
Southern Region

The New Crops Research Branch announced plans for the following plant explorations of interest to plant scientists in the Southern Region:

1. Eastern Africa - 4-month exploration by Dr. R. E. Perdue beginning October 1966

2. Collection of oilseeds in Africa by Dr. C. E. Smith starting in December 1966

3. Collection of cereals, fruits, and forage plants in Russia by Dr. W. H. Skrdla and Dr. Howard Brooks beginning August 1967

4. Exploration to collect sorghum in Western Ethiopia by Bernard Leese during the late summer of 1967

Following is a list of plant materials that research workers in the South requested plant explorers to collect on those trips:

Arkansas	
J. N. Moore	Pomological material Russian Vinefera grapes, particularly hardy seedless grapes
Florida	
G. B. Killinger	Kenaf, seed or vegetative material of tall, late maturing types with large stems; straight stem with little or no side branching Seeds or plants of Entolasia imbricata. This grass can be seen at the Kitale Grassland Research Station and at Ibadan Univ. Digitaria from elevations of 10,000 feet or higher
Wayne B. Sherman	Low chilling raspberries
Georgia	
A. R. Brown	Short stiff strawed barleys Leaf rust resistant barleys Leaf rust resistant wheats
D.R. Cummins	Tall fescues
F. E. Johnston, Jr.	Peach material which has promise as a long-lived rootstock (particularly nematode and disease resistant rootstocks)

Kentucky	
Norman L. Taylor	Trifolium apertum Bobr. T. seravschanicum ovcz. T. fontanum Bobr. T. borysthenicum Gruner T. expansum W. et K. T. molineri Balb. T. trichocephalum M. B. T. caucasicum Tausch. T. canescens Willd.
North Carolina	
D. L. Strider	Lycopersicon (particularly from Bulgaria) which is resistant to bacterial canker
D. C. Zeiger	Apple rootstocks, particularly rootstocks which would dwarf trees Rootstock resistant to mouse feeding
Oklahoma	
George R. Waller	Nepeta cataria L., or other plants in Africa that serve as attractants to the big cats, such as lions and tigers; plants that produce compounds that serve as animal attractants and repellants
Puerto Rico	
J. Velez Fortuno	Fruits from the coffee regions in East Africa Fruits, vegetables, industrial crops, forages, from the dry areas of East Africa where annual rainfall is lower than 20 inches Senna from as many regions as possible, especially Cassia acutifolia Figs, Ficus carica, of high ficin content Plant material of the genus Musa, particularly bananas and plantains for resistance to Panama disease (Fusarium oxysporum f. cubense) &to sigatoka disease (Mycosphaerella musicola)
South Carolina	
W. C. Barnes	Cold tolerant and drought tolerant cucumbers
Texas	
M. L. Kinman	New collections of Cyamopsis serrata, C. senegalensis, and wild spp. of Sesamum Advanced sunflower varieties, strain, or lines ('Luch' and 'Vympel')
Ethan C. Holt	Cenchrus ciliare, cold hardy types Panicum coloratum, shatter resistant
Wayne G. McCully	Choice selections of grass materials in the Triticeae (Hordeae) (Agropyron, Elymus, etc)
Michael F. Schuster	Rhodes-grass immune to scale

Virginia

G. D. Oberle

Winter hardy varieties or types of Vitis vinifera which have demonstrated tolerance or resistance to black rot, anthracnose, and downy mildew

Hybrids of Vitis vinifera and winter hardy species such as Vitis amurensis or other species of Asian origin, especially those representing several generations of breeding and selection for winter hardiness and ability to escape damage from disease infection

Types or varieties of apricots that have demonstrated resistance to winterkilling of fruit buds and which have later season of blossoming than other types available in the United States. Resistance of the fruits to cracking as the ripening season approaches would also be desirable

Sweet cherry varieties that do not crack under the influence of showers or heavy dews as the fruits ripen

Varieties or types of domestica plums whose fruit buds are more hardy to winter cold and whose fruits are less susceptible to attack by the brown rot organism. Gage type plums more tolerant to brown rot infection

Soil Conservation Service

W. C. Young

Pome and other fruits of small statue with wildlife and ornamental value

Warm season native perennial forages which may be rhizomatous

Bothriochloa caucasica

Red clover

APPENDIX B

State & Federal Reports

Southern Regional Plant
Introduction Station

Alabama
Arkansas
Florida
Georgia
Louisiana
Mississippi
North Carolina
Oklahoma
Puerto Rico
South Carolina
Tennessee
Texas

Soil Conservation Service
Utilization Research &
Development Divisions
New Crops Research Branch

REGIONAL STATION REPORT

S-9 Technical Committee Meeting
1967

Plant Introduction

During the year beginning July 1, 1966 the regional station received seed of vegetative stocks of 814 new accessions. There were no large collections of individual species. Instead the new material represents a wide assortment of grasses, legumes, and horticultural plants. Much of the new material was obtained from Spain under Public Law 480 Contract.

The domestic exploration to collect Vaccinium spp. was initiated July 1, 1966. Dr. Galletta and Dr. Bell collected 23 accessions in the mountains near Blue Lake, Virginia last August. Two collecting trips were made to Florida and southern Georgia during May and June. Dr. Galletta returned from the last trip only a few days ago, and I have not received a complete report of the materials collected on these two trips. He plans to make additional collections this summer in the Appalachian Mountains and in northern states.

Seed Increase and Evaluation

The total number of accessions planted for seed increase this year, including winter legumes planted last fall, is 3393. These plantings are summarized below:

Materials grown for seed increase. 1967

Crop	Number of accessions
Grasses	168
Sorghum and millet	492
Summer legumes	156
Winter legumes	390
Southern pea	508
Peanuts	207
Brassica	28
Misc.	12
Carry-over of perennial grasses	1432
TOTAL	3393

The entire collection of southern peas was planted. They show promise of making an excellent yield; and because of the diversity of genetic material in this collection we have invited southern pea breeders in the region to visit the nursery, make their own evaluation, and select material that would be useful as breeding stocks.

Fifteen new accessions of chemurgic interest were received at the regional station for seed increase and preliminary evaluation last year. Euphorbia lagascae and Helenium microcephalum were full of blooms but because of diseases made poor seed yields. Briza spicata made a fair seed yield. The remaining accessions, including five new Vernonia spp. were too late at Experiment. Of these, six accessions did not bloom, and seven bloomed sparsely or did not mature seed by frost. Sisymbrium alliaria seed did not germinate.

Twenty-two accessions of chemurgic interest were received for seed increase this year. Of these, six were cool season species that will be planted next fall or in early spring. The other 16 were planted last spring.

Five accessions that have shown promise for pulp production, but failed to mature seed at Experiment, Georgia, were increased in Puerto Rico sufficiently for regional tests. These are okra P.I. 291124, Sesbania exaltata P.I. 296055, and kenaf P.I's. 305078, 305079, and 305080.

Distribution of Seed

Although fewer new materials were received last year than we usually obtain, more seed were distributed than in recent years. Eleven-thousand-four-hundred-ninety-nine packets were supplied to research workers in the Southern region. Five-thousand-five-hundred-sixty-five packets went to workers in the other 3 regions and overseas. Small samples of five-thousand-four-hundred-thirty-three accessions were placed in the National Seed Storage Laboratory as a safety measure against loss by fire or other disaster. This movement of seed will be continued until a representative sample of each accession at the Regional Station is deposited in NSSL.

Distribution of seed in the Southern Region

State	S-9	NE-9	NC-7	W-6	Miami	Glenn Dale,Md.	Total
Alabama	184	11	45	21	-----	-----	261
Arkansas	4	--	3	34	-----	-----	41
Florida	952	18	623	43	-----	-----	1636
Georgia	1704	14	12	22	164	2	1918
Kentucky	--	--	26	2	-----	-----	28
Louisiana	76	14	1	--	1	-----	92
Mississippi	168	39	51	75	-----	-----	333
North Carolina	2	1	--	--	-----	-----	3
Oklahoma	165	--	17	128	-----	-----	310
Puerto Rico	232	--	--	--	-----	-----	232
South Carolina	2801	370	306	1	-----	-----	3478
Tennessee	442	7	--	--	-----	-----	449
Texas	2239	2	41	225	-----	-----	2507
Virginia	113	97	--	1	-----	-----	211
TOTAL	9082	573	1125	552	165	2	11,499
NE-9	442						
NC-7	843						
W-6	2956						
Foreign	1324						
TOTAL	5565						
NSSL	5433						

Identification of Plant Species

In recent years there has been much confusion about the nomenclature of Capsicum species. Many accessions that we maintained as Capsicum frutescens were considered by pepper breeders to be C. annuum. Some accessions of other Capsicum species were also listed under the incorrect name according to modern taxonomic concepts. This difference of opinion had resulted from changing taxonomic concepts among plant scientists working with peppers. The entire pepper collection was grown last year for identification. Dr. C. E. Smith, Taxonomist with the New Crops Research Branch, spent several days at the regional station and identified each accession.

In addition to classifying the peppers, herbarium specimens of 103 accessions not previously identified as to species were prepared and submitted to the New Crops Research Branch for identification. These included 36 sorghums, 51 grasses, 16 horticultural plants, and 6 legume specimens.

Screening for Disease Resistance

Resistance of sorghum to anthracnose - Of the 800 introductions screened for resistance in cooperation with Dr. H. B. Harris, almost half were resistant in the field. These are being retested in a replicated test in the field this summer. Three greenhouse screening tests involving 200 of the above introductions were completed. The mutation of the stock culture of the pathogen to a non-pathogenic isolate prevented further greenhouse screening. The results of the greenhouse screening tests confirmed, in general, the results of field tests.

Resistance of squash to WMV-2 - In cooperation with Dr. James Demski, who is investigating cucurbit viruses, all cultivars of squash, Cucurbita pepo, carried in stock by a major seed company were inoculated with WMV-2. None were resistant. The Cucurbita pepo collection has been obtained from the Northcentral Plant Introduction Station for screening for resistance to this virus.

Resistance of lima bean to anthracnose - Eight commercial varieties were susceptible when tested in the greenhouse. Experiments were conducted to determine (1) Optimum concentration of conidia in the inoculum (2) Optimum length of incubation in moist chamber (3) Optimum plant age, and (4) Optimum age of inoculum. Results of these tests indicate that lima bean introductions can be accurately screened in the greenhouse for resistance to anthracnose.

Resistance of peanut to peanut mottle virus - A new approach was taken in screening for resistance to this disease. This approach was based on the concept re-emphasized by Leppik[1/] [2/] that the center of

1/ Leppik, E. E. A pathologists viewpoint on plant exploration and introduction. FAO Plant Introduction Newsletter No. 15. Feb. 1965. Rome, Italy.

2/ Leppik, E. E. Searching gene centers of the genus Cucumis through hist-parasite relationship. Euphytica 15:322-328. 1966.

origin is the most promising area to search for disease resistance. This is true only if the pathogen has also been present at the center of origin. Since the world distribution of peanut mottle virus is not known, samples of 100 peanut introductions each, from the three major sources of the peanut collection, were tested for resistance. No resistance was found except in North American cultivars. This may indicate that the virus, and consequently the opportunity for natural selection to occur, has been absent at the center of origin. This research was done in cooperation with Dr. C. W. Kuhn.

Resistance of peanut to peanut stunt - In cooperation with Dr. Kuhn approximately 300 peanut introductions were screened for resistance to stunt. No resistance was found.

The utilization of plant introductions by virologists - Two important uses of plant introductions have received very little notice in the literature. These are the use of plant introductions by virologists as a means of establishing the host range and of finding a suitable local-lesion host for an individual virus. In most publications involving the use of plant introductions by virologists the P.I. number is seldom mentioned.[1/] Yet, many introductions were collected as definite cultivars in the country of origin and may react somewhat differently to specific viruses. For example, Kuhn and Brantley[2/] reported that 'Clay' showed necrotic local lesions while P.I. 205139 was immune to Southern Bean Mosaic virus. Most introductions give a third type of reaction to this virus, the susceptible reaction. Therefore, if other scientists are to be able to repeat the results it is extremely important for the plant scientist to publish the P.I. number of the plant material used in his research. Even when no difference is found in the reactions of a number of introductions[3/] a listing of the introductions used may facilitate the prompt, accurate, filling of seed requests from later investigators so that they may use the same introductions. The utilization of plant introductions by virologists will increase in the future as plant virus research is expanded. The following groups of introductions available at the Southern Regional Plant Introduction Station appear to be the most promising for this purpose.

Group	Number genera	Approx. No. introductions
Miscellaneous legumes	24	160
Vigna spp.	4	320
Cyamopsis tetragonoloba	1	140
Miscellaneous cucurbits	5	130

1/ Shepherd, R. J. 1964. Properties of a mosaic virus of cowpea and its relationship to the bean pod mottle virus. Phytopath. 54:466-473.

2/ Kuhn, C. W. and B. B. Brantley. 1963. Cowpea resistance to the cowpea strain of southern bean mosaic virus. Pl. Dis. Reptr. 47:1094-1096.

3/ Izadpanah, Keramat, and R. J. Shepherd. Galactia sp. as a local lesion host for the pea enation mosaic virus.

Compilation of information on the insect and disease resistance of plant introductions - A summary of reports on the resistance of plant introductions to diseases, insects and nematodes, Medicago spp. was published. This publication contains a table listing the multiple resistance of alfalfa introductions. The following disease data supplied by cooperators will be listed in the next seed catalogue:

1. Reactions of peanut introductions to sting, northern rootknot and peanut rootknot nematodes. Dr. L. I. Miller, Holland, Va.

2. Reactions of 900 Cucumis melo introductions to powdery mildew. Dr. T. W. Whitaker, La Jolla, California.

3. Reactions of 184 introductions of guar to potato virus S. Dr. C. E. Logsdon, Palmer, Alaska.

4. Reactions of 156 Cucumis melo introductions to watermelon mosaic virus 2. Dr. R. E. Webb, Beltsville, Md.

5. Reactions of several hundred Cucumis melo and Citrullus vulgaris introductions to Verticillium albo-atrum. Dr. C. B. Skotland, Prosser, Washington.

Automatic Data Processing

The use of IBM cards was adopted for recording evaluations of plant introductions. Tabulation of data for punching cards was initiated in late May. Evaluations for about 2/3 of the seed collection at the regional station have been tabulated and 4500 cards have been punched. We hope to complete this transfer of information to IBM cards within the next few weeks. Evaluations obtained from S-9 cooperators will be recorded as well as those observations made at the regional station. The IBM "print-out" from these cards will be used in preparing the seed catalogues that we distribute each winter.

Financial Statement

Sources of Funds and Expenditures of the Southern Regional Plant Introduction Station

Source of Funds	Amount 1966-67	1967-68
Regional Research Funds (pooled)	$30,000	$30,000
Regional Research Funds (Georgia)	13,194*	17,000*
State appropriations (Georgia)	2,653	2,553
New Crops Research Branch, ARS	35,900	32,000
TOTAL	$81,747	$81,553
Expenditures	**1966-67**	**1967-68 (Proposed)**
Salaries	$62,475	$67,800
Seasonal labor	6,300	4,253
Operating supplies	4,572	5,000
Capital outlay	6,808	2,000
Travel	1,530	2,500
TOTAL	$81,685	$81,553

* Includes funds supporting contributing project H-172

New Facilities and Equipment

A metal building located at the nursery has been completed and put into use. The building which is 24' x 42' was partitioned in the middle. One section is used for seed dryers and for storage of seed cleaning equipment and small implements used in the nursery. The other section is used for threshing, cleaning, and packaging seed for storage. This facility, being near the nursery, increases efficiency in harvesting and cleaning seed. It eliminates hauling material from the field through congested traffic to the greenhouse.

Other equipment purchased last year includes:

Binocular microscope
Farmall 140 tractor with cultivator attachment
1000' of irrigation pipe with necessary fittings and sprinklers
Plant and head thresher for cleaning grass and legume seed
Seed blower for cleaning seeds

A request for $65,000 to construct new greenhouse and laboratory facilities at the regional station was submitted to the Southern Directors. The request was approved, and plans have been completed for the construction of 2 greenhouses, each 24' x 60', and a headhouse with laboratory facilities for disease and insect screening work. Construction should begin soon after Congress passes the 1968 appropriations bill for agriculture.

Publications

Corley, W. L. Georgia's domestic fruit exploration. Ga. Agr. Res., Vol. 8, No. 1. Summer 1966.

Corley, W. L. Some preliminary evaluations of Cucumis plant introductions. Ga. Agr. Exp. Stas. Bul. N.S. 179. Dec. 1966.

Massey, J. H. Preliminary evaluations of some introductions of Persian clover, (Trifolium resupinatum L.). Ga. Agr. Exp. Stas. Bul. N.S. 180. Dec. 1966.

Massey, J. H. Preliminary evaluations of sesame plant introductions. Ga. Agr. Exp. Stas. Bul. 181. Dec. 1966.

Massey, J. H. Some prospective new chemurgic crops. Ga. Agron. Abstr. 10:18. Jan. 1967. (Abstract)

Sowell, G. Jr., K. Prasad and J. D. Norton. Resistance of Cucumis melo introductions to Mycosphaerella citrullina. Pl. Dis. Reptr. 50: 661-663. 1966.

Sowell, G. Jr. The geographical distribution of cultivated plants resistant to diseases. Bul. Ga. Acad. Sci. 25:66. 1967 (Abstract)

Report on S-9(Plant Introduction)
Alabama
July 1966 - July 1967

A total of 306 new plant introductions were received during the past year. Of these introductions, 165 were vegetable crops, 124 forage grasses and legumes, and 17 ornamentals.

CHEMURGIC CROPS

Low seed yields were obtained with several Cassia introductions in a replicated yield test at Tallassee, Alabama:

Entry	Dry seed per acre lbs
Cassia occidentalis 271140	883
Cassia occidentalis 200812	792
Cassia bonariensis 214042	666
Cassia occidentalis 246379	474
Cassia mimosoides 224966	272

Foliar diseases were serious on P.I. 246379, 271140, moderate on P.I. 214042, and 200812, and absent on P.I. 224966.

Plantings of Brassica sinapistrum 296062 and 296079 and B. hirta 296037 made in the fall of 1966 bloomed during late winter. Stand losses due to an unidentified stem disease in late winter resulted in poor seed production.

HORTICULTURAL CROPS

Atkinson, a new rootknot nematode and Fusarium wilt resistant tomato of the Rutgers class, was released the fall of 1966. This tomato, bred by Dr. W. H. Greenleaf, incorporated rootknot resistance of the wild Peruvian tomato P.I. 128657.

A tomato machine harvest breeding program is in progress. A source of dwarf habit, concentrated fruit set, and maturity is

P.I. 273444 (Dr. T. O. Graham selection No. 1).

Tobasco pepper breeding by Dr. Greenleaf is using two sources of resistance to tobacco etch virus: Capsicum sinanse P.I. 152225 and 159236.

Dr. J. D. Norton has determined the node of inheritance of resistance to gummy stem blight by Cucumis melo P.I. 140471. Muskmelon breeding lines with disease resistance are currently being evaluated in trials for possible release.

Dr. H. J. Amling reports on two apple introductions: P.I. 25599 - tree vigorous, fruit very large but few in number, strawberry strip color, fruit water cores. No promise as a commercial variety. P.I. 209939 - vigorous tree, heavy bearer, fruit oblate shape.

Dr. H. P. Orr reported that the following broadleaf evergreens are particularly outstanding and may be useful ornamentals: P.I. 243844 - Ilex altaclarensis - good foliage and habit of growth. P.I. 242291 - Osmanthus - good habit of growth. P.I. 238030 - Osmanthus x fortunei - good habit of growth. P.I. 242236 - Osmanthus x fortunei - good habit of growth. P.I. 277664 - Raphiolipis umbellata "Mertensii" - good foliage and fruit.

FORAGE CROPS

Several outstanding hardinggrass (Phalaris tuberosa) selections were made from the large number of plant introductions obtained over the past few years. These selections, together with polycross nursery material, are being tested in yield trials at three locations. Plant introductions differ considerably in winter forage production and summer survival. In vivo digestibility of forage

from the Phalaris introductions is higher than that of tall fescue.

Of the 27 Digitaria accessions planted at the Gulf Coast Substation, all except P.I. 299690 survived the winter. Digitaria pentzii 299743 and D. milanjiana 299675 were outstanding in production and leafiness. Yield tests are now in progress at two locations.

Dolichos biflorus 179688 continued to show promise as a productive leafy annual summer forage legume. A seed increase was made for evaluation under grazing.

A number of Trifolium accessions obtained in previous years have been entered in yield trials. Additional testing is needed before drawing conclusions.

Ball clover P.I. 206769, now grown on over 200,000 acres in Alabama, has adapted well to different environments. Local ecotypes of ball clover developed in fields reseeding for 5 to 9 years. Ecotypes originating in southern Alabama made more rapid autumn growth, considerably more winter forage, and bloomed slightly earlier than those from further north in the State.

Yuchi arrowleaf clover (I. vesiculosum 233816) performed very well on farms this past winter. This new variety was very productive, even though spring drought conditions seriously cut yields of crimson and ball clovers. At the Wiregrass Substation in southeast Alabama steers grazing rye-yuchi arrowleaf clover gained 550 lbs/acre from November to June as compared to 436 lbs/acre gain on rye-crimson clover from November to April. Nearly 850 acres of certified Yuchi arrowleaf were grown in Alabama for seed production druing 1967. A grower association has been formed for promotion and marketing of seed.

Grazing tests on grass sods are continuing with interspecific vetch hybrids developed by Dr. Donnelly. These vetches have the hard-seeded character of Vicia cordata 121275 incorporated into reseeding hybrids.

PUBLICATIONS ISSUED DURING THE YEAR

1. Donnelly, E. D. and C. S. Hoveland. 1966. Interspecific reseeding Vicia hybrids for use on summer perennial grass sods in southeastern U.S.A. Proc. 10th Internat. Grassland Congress. Helsinki, Finland. pp. 679-683.
2. Greenleaf, W. H. Atkinson, a new rootknot and wilt resistant tomato variety. 1966. Auburn Univ. Agr. Exp. Sta. Leaflet 73.
3. Hoveland, C. S. 1966. Ball clover, successful foreign plant introduction. Chemurgic Digest, Vol. 24, No. 1.
4. Hoveland, C. S. 1967. Yuchi arrowleaf clover. Crop Sci. 7:80.
5. Hoveland, C. S. and W. C. Johnson, Jr. 1967. Natural selection of ball clover ecotypes. Crop Sci. 7 (to be published in August issue).
6. Hoveland, C. S. and W. C. Johnson, Jr. 1966. Nature changes ball clover on Alabama farms. Auburn Univ. Agr. Exp. Sta. Highlights of Agr. Res. Vol. 13, No. 4
7. Norton, J. D. Inheritance of resistance to Mycosphaerella melonis in Cucumis Melo. 1966. Proc. XVII Internat. Horticulture Congress. Vol 1, pp. 444-445.
8. Norton, J. D. Inheritance of resistance to Mycosphaerella citrullina in muskmelon. Proc. Am. Soc. Hort. Sci. (accepted for publication in March 1967).

S-9 Technical Committee Report
Arkansas Agricultural Experiment Station
Fayetteville, Arkansas

On March 24, 1967, John L. Bowers, Professor of Horticulture, was appointed to serve as the Arkansas representative on the S-9 Technical Committee as a replacement for Dr. A. M. Davis. Shortly thereafter, he was notified by Dr. R. L. Lovvorn, Administrative Advisor S-9 Technical Committee of the official replacement of Dr. A. M. Davis.

Dr. R. D. Riggs and M. L. Hamblin completed their work in screening numerous plant introductions to the soybean-cyst nemotode and their findings were published in the Arkansas Agricultural Experiment Station Bulletin 718, December, 1966. Their summary on this work is as follows: "Heterodera glycines reproduced on 334 of 677 legumes and 62 of 280 non-legumes tested. These represented 103 species in 17 genera of legumes and 48 species in 43 genera of non-legumes which had not been reported previously as hosts. The host range is expanded to include representatives of 23 plant families."

Dr. A. M. Davis completed the test on varieties and cultural studies on sugar beets under the project, entitled, Introduction and Evaluation of New or Special Plants for Industrial and Agricultural Use and the findings were reported in Arkansas Agricultural Experiment Station Bulletin 721, March 1967. Dr. Davis reported that these tests were carried out at Fayetteville, Clarkedale, Keiser, Rohwer and Manila. Davis stated "supplemental irrigation was needed at some time in each year of the testing program."

"Yields of beets of marketable quality and quantity were not obtained regularly from these tests. The most promising area of the state for sugar beet production was found to be the heavy soil areas of Northeast Arkansas. Those beets that survived to harvest had an adequate sugar level for commercial extraction."

He points out that relatively high humidity of the state favors the development of such foliage diseases as cercospora leaf spot which weaken the plant for the secondary attack of root diseases.

He concluded that these points must be considered if sugar beets are to be grown commercially in the state: "The disease problem must be overcome. Menatodes must be controlled. Irrigation must be available. A processing plant must be built to market the crop. Finally, acreage allotments must be made available to the production area."

Based on 1966 field studies, Davis reported that "P.I. 291124 (Kenaf) failed to flower but as the days became cool and short it defoliated naturally. During this same period the everglades selections retained their leaves and required artificial defoliation. Summer planted Crambe

failed to produce seed during warm weather, the plants lived and only produced seed as the temperatures cooled in September. Euphorbia lagascal (P.I. 296064) failed to produce mature seed but good plant growth was obtained. Selections from P.I. 304909 Vernonia anthelmintica were made on the basis of apparent seed retention. Seed gum sources (Cassia, Dalea, Indigofera) produced so few mature seed that the lines included in the test appear to be of no immediate value."

Dr. M. J. Goode, Plant Pathologist, obtained all plant introductions in the genus Citrullus that were available in January 1963 and screened these for cercospora leaf spot, caused by Cercospora citrullina, Cooke. In addition to the plant accessions, 18 varieties and several breeding lines were also screened. No resistant source was found.

Twenty-four grape accessions are in established plantings on the Main Station at Fayetteville and on the Fruit Substation at Clarksville. The vines are fruiting this season and will be evaluated in July and August. Dr. James N. Moore, Associate Horticulturist, is in charge of this program and is searching for material to use in the breeding of a seedless table grape. In addition to grape accessions, Dr. Moore is evaluating five accessions of the genus Rubus at the same two locations where the grape accessions are planted.

Thirty-eight accessions of southern peas are being grown in the field at Fayetteville to observe reaction to the virus complex which is so frequently manifested in the late plantings of this crop in Arkansas.

Dr. J. L. Dale, Department of Plant Pathology, has checked a limited number of Sorghum almum P.I.'s for their reaction to the maize dwarf mosaic virus.

Florida Report to S-9 "New Plants"
July 18-19, 1967 College Station, Texas
Gordon B. Killinger

Various commercial nurseries, private citizens, Junior Colleges, cities and the Florida Agricultural Experiment Stations system received several thousand new accessions as seed or plants during the past year with the bulk of material furnished from the Experiment, Georgia Introduction Station.

Grasses, legumes and vegetable seeds accounted for most of the introductions.

This report will deal with individuals at specific locations in Florida.

From the West Florida Station at Jay, L. S. Dunavin reports "Siratro" Phaseolus atropurpureus (IRFL#483) as living through the winter with fair forage production. Cajanus cajan, Pigeon pea, makes good growth and P.I. 218006 received from W. T. Fike has been planted in pure stands and mixed with millet. Dunavin lists the following Trifolium spp. out of 60 accesstions as having the most promise: T. rubrum P.I. 258454, T. ruepellianum P.I. 234411, T. angustifolium P.I. 287944, T. arvense P.I. 249864, T. obscurum P.I. 258404, T. miegeanum P.I. 258406, T. nigrescens P.I. 249855 and T. meneghinianum P.I. 235521. Digitaria milanjiana P.I. 299655 is the only Digitaria of a number under test at West Florida which has survived two winter periods.

From the North Florida Station at Quincy, W. H. Chapman reports Avenae sterilis selections introduced into this country by H. C. Murphy of Beltsville and I. Wahl are being crossed with hexaploid oats and have a very high degree of crown rust resistance. In addition, it has been recently found that seed of some of these selections have 50% more protein than the oats now grown.

From the Gainesville area N. R. Lake, Superintendent of Grounds Department reports P.I. 307263 and 307264, Hedychium coccineum as growing good and as a welcome addition to our common Hedychium coronarium. Juniperus spp. G 14137, G 14138 and G 14139 also Cleyera japonica P.I. 237916 and Pittosporum tobira P.I. 275399 are being compared with the same species used as landscape plants on the U of F campus. At present only the Cleyera appears different from those already grown. Mr. Lake reports that P.I. 244685 Hedera helix (Bulgarian Ivy) was received as a plant in 1964 and has been increased to plant 500 sq. ft. as a ground cover this spring. Six rhizome pieces of seven different bamboo varieties were received from the Savannah, Ga. Station and are to be used as landscape plants at the U of F new Physical Plant area.

G. M. Prine lists P.I. 151982 and an unknown P.I. from Tifton, Ga. as perennial peanuts with promise as lawn mixtures and ground cover. For pasture and highway shoulders he lists P.I. 118457 and P.I. 262839 A. galbrata 'Arb and Arblick' and P.I. 262828 and 262414 both A. spp along with a Gainesville selection as being of most promise with the later being a rapid spreading selection.

R. H. Sharpe, Department of Fruit Crops suggests the planting in Florida of 'Hanagosho', 'Fuyu', and 'Gianbo' persimmon varieties direct from Japan and 'Hanafuyu' and 'Jiro' varieties received through the Chico station. A persimmon paper was published in the Florida State Hort. Soc. 79:374-379 and reprints will soon be available. Sharpe is interested in plum varieties from the San Pedro area of Argentina as well as from Taiwan and would appreciate material from these areas if explorations are made in these countries.

A. P. Lorz reports on cold tolerance of Pisum sp. under exposure to 17° F with no injury to P.I. 269761 (P. elatius) very slight injury to P.I. 244175 and 244235, good resistance for P.I. 137120 and moderate resistance for P.I. 244114. He suggests this material be used as a breeding source for cold hardiness and that P.I. 244125 be considered as a winter cover crop in Florida because of its heavy leafy habit combined with excellent cold hardiness. Lorz notes Phaseolus sp. P.I. 314902 P. lunatus (Costa Rica) is late vigorous, red-seeded and possibly short-day reaction. P.I. 214903 and 314904 are probably short-day types, flowering for only a short period in winter greenhouse and is likely not P. vulgaris resembling more P. polyanthus but has white instead of blue flowers. P.I. 269666 (Vigna sinensis) continues to be of interest from a breeding standpoint because of its early determinate production of pods on erect peduncles from small prostrate plants.

S. C. Schank in Agronomy notes the following Digitaria introductions from the Oakes 1964 collection as being the major source of germ plasm for hybridization: P.I.'s 209579, 299602, 299606, 299608, 299694, 299713, 299723, 299745, 299748, 299761, 299837, 299850, 299861 and 299892. A few selections from several hundred interspecific crosses appear promising.

G. B. Killinger in Agronomy notes Hemarthria altissima P.I. 299995 from the Oakes 1964 collection has frost and cold tolerance, makes early spring growth and spreads rapidly by stolons and rhizomes. Bungomagrass (Entolasia imbricata) P.I. 318669 introduced from Kitale-Kenya Africa has made excellent growth is flowering in June and is reported to contain high protein. Brassica carinata P.I. 243913 from Ethiopia has been selected for light colored seed production with several pounds harvested in 1967 and being evaluated by Dr. Wolff. Mid to late August seeded sunflowers produced from 650 to 2200 pounds of seed per acre by early November with mildew and corn-ear worms being the only serious production problems. Kenaf, Hibiscus cannabinus, Everglades 41 variety, made palatable silage when harvested at a six foot growth stage. Young dairy animals consumed kenaf silage at the rate of 149 pounds per day per 1000 pounds of body weight. Intake of 24.4 pounds of dry matter containing 29.2 megocalories (energy) and 2.3 pounds of digestible protein. Tegates minuta (South American Marigold) planted in April, May and June grew well and all produced seed by November. By seed harvest the above portion of the plants weighed 29,288 pounds per acre, were 39.39% dry matter or 11,537 pounds of oven-dry plant material per acre. This might be a possible green manure crop or cover crop in addition to its nematode control abilities. Pigeon pea seed (Cajanus cajan) P.I. 218066 were received from Dr. Fike and planted for seed increase with the crop a possible cover-crop with resistance to several root knot nematodes. Paspalum notatum P.I. 310149

from Brazil appears to be a rapid growing upright, semi-broad, leaf type of bahiagrass. Other recent P. notatum introductions received from Langford appear to have more variation of type than all preceeding introductions. Rhynchelytrum repens P.I. 300097 seems to be a fast growing white top-red top grass.

P. S. Westgate at the Central Florida Station, Sanford reports the growing of kenaf varieties on peat and sand soils near Sanford. Growth was best on peat and nematodes were a serious pest on the sands. A number of ornamentals were received at the Sanford Station, but have not been evaluated.

E. M. Hodges and J. E. McCaleb report extreme weather conditions, both cold and dry at that location made it impossible to evaluate legumes and grasses.

T. Cochis from the Plantation Field Laboratory, Fort Lauderdale received 44 ornamental plants from Glenn Dale and Geneva, but needs more time for evaluation.

A. E. Kretschmer, Jr. reports from the Indian River Field Laboratory at Fort Pierce as having 200 summer-growing P.I. numbered legumes. He reports an Experiment Station circular in publication concerning Stylosanthes humilis in permanent pastures in South Florida. The original S. humilis seed used at this station came from P.I. 187098.

The various experimental stations and departments in Florida will continue the search for new or improved genus, species or varieties of grasses, legumes, vegetables, ornamentals, fruits and industrial use crops.

G.B.K.
290 - Fla.
July 10, 1967

GEORGIA S-9 ACTIVITIES (NEW CROPS)

July 1966 - July 1967

George Tereshkovich
Department of Horticulture
Georgia Experiment Station
Experiment, Georgia 30212

State and Federal scientists, and private individuals in Georgia received a total of 1,704 introductions during the past year. The requests included grasses, legumes, fruits, vegetables, and ornamentals. Research with new crops and plants is being conducted at the Georgia Experiment Station by three contributing projects: Hatch 172 (S-9), Hatch 173 (S-9), and Hatch 174 (S-9).

HATCH 172 (S-9)

Agronomic Evaluation of New Plants for the Production of Oils, Gums, Drugs, and Insecticides

Project Leader: John H. Massey
Southern Regional Plant Introduction Station
Experiment, Georgia 30212

Cassia occidentalis, 1966

Table 1. Seed yield (lbs./A) of *Cassia occidentalis* grown at three row widths and three within-row spacings.

Row width (in.)	Within-row spacing (in.)			
	4	8	16	Avg.
12	597	645	1113	785
18	557	726	1049	777
36	791	1081	1033	968
Avg.	648	817	1065	

P.I. 292844 planted on June 3.
Fertilizer, (4-12-12) broadcast at 800 lbs./A before planting, and 300 lbs./A sodium nitrate side-dress one month later.
Seed harvested November 18.

Ricinus communis, 1966

Table 2. Plant height and seed yield of Ricinus communis grown at four fertility levels.

N, P_2O_5, and K_2O (lbs./A)	Plant height (in.)	Seed yield (lbs./A)
0 - 0 - 0	26	812
30 - 30 - 30	31	1161
60 - 60 - 60	36	1615
90 - 90 - 90	37	1929

Hale variety planted on June 1.
Fertilizer applied in row as 4-12-12 at planting time and 2/3 of N applied as side-dress one month later.
Plants spaced 16 inches apart in 42-inch rows.

Vernonia anthelmintica, 1966

Table 3. Plant height and seed yield of Vernonia anthelmintica grown at four fertility levels.

N, P_2O_5, and K_2O (lbs./A)	Plant height (in.)	Seed yield (lbs./A)
0 - 0 - 0	43	330
30 - 30 - 30	50	404
60 - 60 - 60	51	482
90 - 90 - 90	53	485

P.I. 283729 planted on June 1.
Fertilizer applied in row as 4-12-12 at planting time and 2/3 of N applied as side-dress one month later.
Plants thinned to 4 inches in 42-inch rows.
Seed harvested weekly, beginning on September 23.

Table 4. Seed yield (lbs./A) of Vernonia anthelmintica grown at three row widths and three within-row spacings.

Row width (in.)	Within-row spacing (in.)			
	4	8	16	Avg.
12	807	661	678	715
18	791	549	597	646
36	702	613	766	694
Avg.	767	608	680	

P.I. 283729 planted on June 3.
Fertilizer, (4-12-12) broadcast at 800 lbs./A before planting, and 300 lbs./A sodium nitrate side-dress one month later.
Seed harvested third week in September.

New Introductions of Chemurgic Interest

Fourteen new introductions of chemurgic interest were planted to study their adaptation to Georgia conditions. Notes recorded in 1966 are summarized in Table 5.

Table 5. Compilation of notes on fourteen new introductions of chemurgic interest, Experiment, Ga., 1966.

Name	P.I. No.	Date of first bloom	Plant Height (in.)	Plant Diameter (in.)	Leaf size Lgth. x wdth. (in.)	Remarks
Cestrum parqui	312837	None	24	10	2.5 x 1.0	Evergreen shrub
Echinacea angustifolia	312814	None	--	--	---------	Stemless plants
Eryngium nudicaule	312838	None	8	8	6.5 x 0.3	
Euphorbia lagascae	296064	6-24	36	24	3.0 x 0.8	
Helenium microcephalum	312818	7-18	44	32	2.5 x 0.8	Winged stems. Ray flowers yellow
Schlechtendalia luzulaefolia	312839	9-26	14	12	6.0 x 1.3	Only one plant bloomed
Sisymbrium alliaria	312820	----	--	--	---------	No germination
Stenachaemium campestre	312840	9-1	12	10	4.5 x 2.0	Only 3 seed heads on 6 rod-rows
Stenachaenium macrocephalum	312841	9-27	84	12	10.0 x 4.5	Winged stems. Seed not mature at frost. Plant leaves malodorous
Vernonia hymenolepis	312850	None	108	60	8.0 x 3.0	
Vernonia kotschyana	312851	9-5	84	72	7.0 x 2.0	Only 3 or 4 seed heads on 3 rod-rows
Vernonia pauciflora	312852	None	72	48	5.5 x 0.5	Many plants wilted
Vernonia sp.	312853	9-30	84	72	7.0 x 3.0	Like V. kotschyana
Vernonia sp.	313117	None	108	60	10.0 x 4.5	Like V. hymenolepis

Work in Progress. 1967

1. An experiment to study the effects of nitrogen levels and within-row plant spacing on seed yield and plant characteristics of sunflower.

2. A test to determine the effect of time of planting on fruiting habits of six introductions of Vernonia anthelmintica.

3. A preliminary study of the effect of harvest time on the seed yield of fall planted Euphorbia lagascae.

4. A preliminary study of the growth and seed yield of fall planted Euphorbia lathyrus.

5. A planting of new introductions of plants that yield oils, gums, drugs, or insecticides.

6. An early-spring planting of 11 introductions of Crambe abyssinica.

Publications

Massey, J. H. Evaluation of plants with chemurgic potential. Ga. Agr. Exp. Stas. Res. Bul. 7. May 1967.

Massey, J. H. Vernonia - a potential new oilseed crop. Ga. Agr. Res. 8(4):9. 1967.

Georgia Experiment Station, Hatch 173 - Evaluation of New Crops for Pulp, Fiber, and Forage

Report to S-9 Committee, 1966
By David G. Cummins

A. Influence of Management, Fertility, and Storage Practices on Kenaf Production.

Interest in the potentiality of kenaf (Hisbiscus cannabinus) for paper pulp is high. It is well adapted to Georgia, especially in the Piedmont and Coastal Plain regions. This interest has led to variety, cultural, and storage evaluation of this crop at Experiment, Georgia. Work was conducted in 1966 in the different areas as follows:

1. No variety tests were planted in 1966. Varieties have been evaluated in previous years.

2. The influence of row spacing, plant population, and weed control on kenaf production was evaluated in 1966. A split-split plot experiment with 4 replications was used. (Rep. 4 was eliminated in the results due to soil variability). The main plots were 2 weed control variables, hand cultivation and no cultivation. The first split was 3 row spacings, 12, 24, and 36 inches in width. The second split was 2 populations, 2 and 4 plants per foot of row. Everglades 71 kenaf was planted on 6-23-66. Six hundred pounds of 6-12-12 fertilizer were applied before planting. When the plants were 3-4 feet high, 100 pounds per acre of nitrogen from ammonium nitrate were applied. The test was harvested on 1-6-67 after frost and freeze had defoliated and reduced the moisture content of the stalks. Results of this test are given in Table 1.

3. The influence of lime, N, P, and K on kenaf production was studied in 1966. A split plot experiment with 4 replications was used. The main plots were 0 and 1,000 pounds per acre of dolomitic limestone. The sub-plots had the following 8 N-P-K variables: 0-0-0, 50-50-100, 100-50-100, 200-0-100, 200-25-100, 200-50-0, 200-50-50, and 200-50-100. The soil type was a Cecil sandy loam with an initial soil test of pH 5.6, and P 15, K 140 pounds per acre, respectively. The lime and fertilizer were broadcast and disked in 6-20-66. Everglades 71 kenaf was planted on 6-21-66. The test was harvested 1-6-67 after the plants were defoliated and the moisture content of the stalks lowered by frost and freeze. Results of this test are given in Table 2.

4. The field phase of a test to study the influence of time of storage on pulp quality of kenaf was completed in August of 1966. Kenaf was cut and baled in January 1965 and stacked in open stacks and in stacks with the tops covered. Initial, 6, 12, and 18 month samples were taken at various positions in the stacks. These samples were sent to the Utilization Laboratory in Peoria, Illinois for pulp evaluation. Laboratory data on these samples are not complete at this time.

Table 1. Kenaf Row Spacing, Plant Population, and Weed Control Test, Experiment, Georgia, 1966.

Weed control	Plants per foot of row	Row spacing, inches	Yield, tons dry matter per acre Replication I	II	III	Avg.
Hand Cultivated	2	12	5.45	6.54	9.00	7.00
		24	8.18	7.22	7.76	7.72
		36	5.71	3.99	6.61	5.44
		Avg.	6.45	5.92	7.79	6.72
	4	12	7.91	8.18	8.31	8.13
		24	7.76	7.91	6.28	7.31
		36	6.53	5.52	4.63	5.56
		Avg.	7.40	7.20	6.41	7.00
	Cultivated	Avg.	6.93	6.56	7.10	6.86
Not Cultivated	2	12	10.90	7.76	8.18	8.95
		24	7.91	7.91	8.18	8.00
		36	5.89	6.16	5.35	5.80
		Avg.	8.23	7.28	7.24	7.58
	4	12	7.63	6.00	7.09	6.91
		24	6.28	4.49	4.23	5.00
		36	5.08	5.63	5.48	5.40
		Avg.	6.33	5.37	5.60	5.77
	Not Cultivated	Avg.	7.28	6.33	6.42	6.68

Plants per foot of row	Row Spacing, Inches 12	24	36	Avg.
2	7.98	7.86	5.62	7.15
4	7.51	6.16	5.48	6.38
Avg.	7.75	7.01	5.55	6.72

Table 2. The Influence of Dolomitic Limestone, N, P, and K on the Dry Matter Yields of Kenaf. Experiment, Georgia, 1966.

Pounds lime per acre	Pounds per acre N-P-K	Dry matter yields, tons per acre				
		Replication				
		I	II	III	IV	Avg.
1000	0-0-0	8.3	10.4	12.8	10.2	10.4
	50-50-100	10.1	11.6	11.7	10.0	10.9
	100-50-100	13.0	13.8	11.0	11.5	12.3
	200-0-100	9.2	9.4	8.0	10.0	9.2
	200-25-100	8.8	11.9	15.3	10.3	11.6
	200-50-0	10.2	10.9	11.9	11.5	11.1
	200-50-50	9.6	11.0	11.3	13.5	11.4
	200-50-100	10.5	13.0	10.4	11.5	11.4
	Average	10.0	11.5	11.6	11.1	11.0
None	0-0-0	13.8	8.9	11.3	11.1	11.3
	50-50-100	10.6	10.8	11.8	11.0	11.1
	100-50-100	10.2	9.2	12.9	12.5	11.2
	200-0-100	9.7	10.9	11.2	12.6	11.1
	200-25-100	10.5	11.0	11.0	11.0	10.9
	200-50-0	10.6	10.9	10.3	11.0	10.7
	200-50-50	11.9	11.5	11.0	11.3	11.4
	200-50-100	12.5	12.1	11.5	9.0	11.3
	Average	11.2	10.7	11.4	11.2	11.1
	Overall average	10.6	11.1	11.5	11.2	11.1

Discussion

Kenaf does a fair job of shading, therefore, controlling weeds. This is evident from Table 1, which shows an average of 6.86 tons of dry matter from the cultivated plots and 6.68 tons of dry matter from the not cultivated plots.

Dry matter yields increased as population increased on the cultivated plots, but decreased as population increased on the cultivated plots. There is no apparent explanation for this difference. It would be expected that lower populations should do better under cultivated conditions, because of less shading. On the overall average, 2 plants per foot of row produced more dry matter than 4 plants per foot, 7.15 tons compared to 6.38 tons per acre.

Dry matter yields increased as row spacing decreased. The largest increase in yield came from decreasing row widths from 36 to 24 inches. Less difference was noted between the 24 and 12 inch rows.

From Table 2, it is evident that there was no response to either lime, N, P, or K. Yields were relatively high in all the treatments, 11.1 tons dry matter per acre on the overall average. The inherent fertility of the soil, especially nitrogen, could have been responsible for the lack of response. A response to nitrogen would have been expected. In comparing the response of kenaf and other non legumes as sorghum on similar soils, the lack of response to P and K might be expected. The initial soil test was low in P and medium in K. Sorghum generally responds only to N on soils testing in this range. Water was not limiting, as irrigation was used during dry periods.

B. Birdsfoot Trefoil Selection.

Ten F_2 generation backcross lines of birdsfoot trefoil were planted in the spring of 1965. These were obtained from crosses made between a Brazilian introduction and some commercial and experimental lines and then backcrossing to each parent. The crosses were made by Dr. Paul Henson. Selections on the basis of vigor, persistence, and growth habit (prostrate or upright) were made in 1966 from this segregating F_2 population. Seed from the more desirable plants were harvested from these plants to be planted and further selected. The objectives are to obtain two superior varieties for this area, one upright for hay and one prostrate for pasture. Some plants seem, at this stage, superior to the commercial checks, Kimey and Granger, which were included in the planting.

C. Fifty-nine Trifolium spp. and 57 Lolium multiflorum PI's were planted in the fall of 1966. They will be evaluated for yield potential and adaptability to this area. Of major interest is the selection of plants capable of producing forage in the late spring for use in a winter grazing program.

Publications:

1. Cummins, D. G. Kenaf, a potential annual pulp crop for Georgia. Ga. Agron. Abst. p. 11. 1966.

HATCH-174 (S-9)

EVALUATION OF NEW ORNAMENTAL PLANTS

Project Leader: George Tereshkovich
Department of Horticulture
Georgia Experiment Station
Experiment, Georgia 30212

This past year, 13 new ornamental selections were obtained from the U.S. Ornamental Plant Introduction Station, Glenn Dale, Maryland; 11 selections from the U.S. National Arboretum, Washington, D.C.; and 19 selections and/or varieties of Taxus (Yew) were obtained for cultural and climatic adaptation studies. To date, over 500 new ornamental plants in several different classifications have been observed for possible usage by the rural-urban homeowner and nurseryman.

Extreme low temperatures during late February, 1969 at this Station (9°F) and (-1°F) at the Georgia Mountain Experiment Station, Blairsville, Georgia, where an ornamental nursery is also maintained, resulted in no apparent injury to any of the established ornamental plants.

Several ornamental P.I.'s (Plant Introduction) and N.A.'s (National Arboretum) selections look particularly good, and these will be propagated for possible distribution to nurserymen and the general public in Georgia in 1968-1969. These plants are as follows:

N.A. 16375-C (P.I. 269293), Cotoneaster dammeri Schneid 'Skogsholmen'

Use: Ground cover. Description: Plants are very low growing (12" in height), compact, vigorous growers, and evergreen. Foliage is small and very attractive. This plant produces coral-red fruit but has not borne any at this Station.

N.A. 15755-C (P.I. 266770), Pyracantha coccinea Roemer 'Keessen'

Uses: Specimen, border plantings. Description: Plants are very vigorous growers, upright and spreading in growth habit, large, and attractive. The foliage is fine (small leaves) with some thorns present along the stems. Leader shoots must be pruned to restrict growth. Flowers are small, white in color, and abundant in number. They are borne in clusters along the entire stem, and bloom period is late March or early April. The plant produces an abundance of yellow berries with berry drop usually occurring in early December. Plants survived a temp-

erature of -2.5°F at this Station in January, 1966 and a -1°F in February, 1967 at the Georgia Mountain Station with no apparent injury to them.

N.A. 19588-C (P.I. 271307), Pyracantha crenulata 'Chinese Brocade'

Use: Specimen, border plantings. Description: Plants are very vigorous growers, large, attractive, upright and spreading in growth habit. The foliage is small with some thorns present along the stems. Leader shoots must be pruned to restrict growth. The plants bloom in mid-April, and produces an abundance of small, white flowers in clusters all along the stems and shoots. The berries produced is yellow-orange in color, with berry drop usually occurring by early December. Plants survived a low temperature of -2.5°F at this Station in January, 1966 with no apparent injury to them.

N.A. 23103 (P.I. 285323), Cotoneaster microphylla

Use: Ground cover. Description: Plants are very compact, evergreen, low growing, and spreading in growth habit, and are vigorous growers. Plant height is not over two feet. Foliage is small and very attractive. Flowers bloom in mid-April, are small, attractive, single, and abundant in number. In balloon stage, the flowers are light reddish-pink, but white when fully open. These plants survived a low temperature of -2.5°F at this Station in January, 1966 with no apparent injury to them.

N.A. 23104 (P.I. 285343), Cotoneaster microphylla

Use: Ground cover. Description: Plants are very compact, evergreen, and possess a low, vigorous, spreading-type growth habit. The foliage is small and attractive. Flowers are small, white, attractive, and produce small, dark red berries. Plants survived a low temperature of -2.5°F at this Station in January, 1966 with no apparent injury to them.

N.A. 23105 (P.I. 285344), Cotoneaster rotundifolia

Uses: Foundation plantings, specimen. Description: Plants are vigorous, upright and open in growth habit, and semi-deciduous. Leaves are very glossy, small and hairy when young. These plants survived a low temperature of -1°F at the Georgia Mountain Station in February, 1967 with no apparent injury to them.

P.I. 226131, Itea japonica Saxifragaceae

Uses: Border, foundation plantings, specimen. Description: This plant is a deciduous shrub growing not more than three feet in height. Plants

are vigorous, compact, and attractive. The foliage turns red in the fall of the year which makes it quite a desirable plant in landscaping. The flowers are white, fragrant, and form dense terminal racemes. Flowers usually bloom in late spring-early summer. This shrub roots easily under mist and is very easy to layer. This plant survived a low temperature of -10°F at the Georgia Mountain Station in January, 1966 with no apparent injury to it.

P.I. 235502, Eurya ochnocea

Uses: Specimen and foundation plantings. Description: Plants are compact, moderately vigorous, and evergreen. The foliage is very attractive, glossy, but the young shoots are susceptible to tip damage when the temperature falls below 20°F. This plant is probably best suited to areas in the lower Coastal Plain and Gulf Coast States.

P.I. 235136, Ligustrum obtusifolium

Use: Foundation plantings. Description: Plants are vigorous, compact, possess a low upright-spreading type growth habit, and are deciduous. Flowers are borne on tips of new growth, and usually in clusters. The blooms are small, white, tube-shaped, and sparse in number. Bloom period is usually early May. These plants survived a low temperature of -2.5°F at this Station in January, 1966 with no apparent injury to them.

Flowering Quince, Chaeonemeles, Variety: Texas Scarlet

Use: Ground cover. Description: Plants are compact, vigorous growers, and possess a low-spreading type growth habit. The flowers are large, single, very attractive, dark red in color, but moderate to few in number. This plant usually blooms in late March or early April. Fruit is large, round, few in number, and yellow-green in color.

Flowering Quince, Chaeonemeles, Variety: Jet Trail

Use: Ground cover. Description: Plants are compact, vigorous growers, and possess a low-spreading type growth habit. The flowers are medium-large in size, single, pinkish white in color, and abundant in number. The bloom period usually occurs in early April. Fruit is large, round, yellow in color, and abundant in number.

The performance of new selections will be evaluated, and continued observation on previously obtained plant material also will be made.

LOUISIANA S-9 ACTIVITIES (NEW CROPS)

July 1966 - July 1967

E. N. O'Rourke, Jr.

Horticulture Department
Louisiana State University

AGRONOMIC CROPS

C. L. Mondart, Jr., Louisiana Agricultural Experiment Station, Baton Rouge, La.

24 Digitaria and 1 Pennisetum accessions were planted at Jeanerette, La., in cooperation with D. C. Meyerhoeffer. These showed insufficient winter survival to warrant further evaluation.

24 Digitaria and 1 Pennisetum accessions (the same as above) planted at Baton Rouge, La. Insufficient winter survival to warrant further evaluation.

20 Panicum maximum accessions evaluated at Baton Rouge, La. Insufficient winter survival to warrant further evaluation.

C. R. Owen, Louisiana Agricultural Experiment Station, Baton Rouge, La.

20 Cynodon accessions planted in July, 1966. There is no report to date on this material.

A. D. Owings, Southeastern Louisiana College, Hammond, La.

1 Crotalaria intermedia. No report to date.

HORTICULTURAL CROPS

Fruit Crops. E. N. O'Rourke, Jr., Louisiana State Experiment Station, Baton Rouge, La.

Accessions received during the fiscal year 1966-1967 included:

2 Malus pumila scions of low-chilling apples from Israel. These are now growing in a nursery at Baton Rouge, La.

29 M. baccata seedlings. Only 8 survived to date in a lath-house bed.

3 M. baccata var. mandshurica seedlings. 2 survive in lath-house.

12 cuttings each of: Ficus gnaphalocarpa
F. sycamorus
F. glomerata

None of the Ficus cuttings survived rooting and transplanting during the winter when they were obtained, but marcots of these were received in June, 1966. F. gnaphalocarpa was poorly rooted and died. The others are included in a nematode resistance screening test underway.

Accessions obtained previously and now reaching early fruiting age include: Malus pumila:

280400 Anna. A low-chilling selection from Israel. It has ripened a moderate crop in late June in Baton Rouge. Color is good and quality acceptable. Shape is like Red Delicious. Scab and powdery mildew have been somewhat bad on this variety.

280401 Gin Shemer. Somewhat later to leaf out than Anna. Apples are attractive, like glossy Golden Delicious. Quality good. Appears more resistant to scab and mildew than Anna.

287822 Vered. Another Israeli apple. It shows some delayed dormancy in Baton Rouge and appears to be self-unfruitful.

263302 Hoover. Reported to have a low chilling requirement. Some delayed dormancy in Baton Rouge. A light crop not yet ripe.

[illegible] Tropical Beauty. Delayed dormancy in Baton Rouge. No crop.

271831 Vilmorin. Delayed dormancy. No crop.

A group of apples from Jean Overcash, Mississippi State University, collected in a domestic exploration, has been maintained near Clinton, La., and is approaching fruiting age. Fire blight has been very destructive to many of these.

Ornamentals. E. N. O'Rourke, Jr.

Lycoris. Four species received in 1961 from Glenn Dale, Md., proved to be mis-labelled. These have been quite well adapted, however, and have increased about ten-fold.

Agapia grandiflora. 124956. Died.

Dianthus superba A and B. 229517. Received in 1964. Good garden performance. The original crowns are still alive. Seed are produced in profusion.

Iris bouvia. 206687. Received in 1964. Plants are small but hardy.

Iris spuria halophylla. 212308. Received in 1964. Hardy. Attractive.

Iris pseudacorus. 250061. Large plants. Very well adapted. White and yellow flowers. No seeds.

Chrysanthemum morifolium:

231093, 231096, 231098, 235896. From Japan. This group, received in 1964, has been well adapted to garden use. The original crowns are still alive and sound. 235904, 235922, and 236041 were obtained in 1966.

Juniperus horizontalis argentea. G-14137. Small plant died.

J. horizontalis cv. Wiltonii. G-14138. Growing. Received 1966.

Belamcanda avalon hybrid. G-13306. B. punctata, G-13308. Received 1966.

Hedera helix. 244685. Received 1964. Well adapted making good ground cover.

Sigmund L. Solymosy, University of Southwestern Louisiana, Lafayette, La.

"At first, National Arboretum introductions: Conifers are very poor subject: They may live under constant care and nursing for 1 or 2 years, only to die thereafter. Exceptions are few: the Hinoki cypress, f. ex.

Rhododendron spp. Eurodendron follow the conifers. In both instances the heat, more so than the cold, is the limiting factor. We grow Philodendron spp. out-of-doors without protection, but lose Pinus sylvestris, P. maritima, etc.

Dr. Green from the Arnold Arboretum sent me a collection of cultivated Jasminum which are under observation and show promise. The several Cinnamomum show alarming progress. You know what they may do if they escape!

One flowering shrub is note-worthy; Spirea douglasii, but his taxon has no business to be here; it was sent as Enkianthus subsessilis!

The Ilex do well. Bill Kosar sent me his I. X Nellie R. Stevens X several male crosses. No complaints concerning their growth. Their ornamental value is still under evaluation.

Some of the older introducitons, f. ex., Distylis racemosa is a promising evergreen, flowers well (typical Hamamelis flower) but flowers are so small

and the plant resembles alarmingly to wax-leaf-ligustrum. So----I do not predict an enthusiastic reception by the public.

Ternstroemia japonica 'Mokof' - a plant introduced after Creech's Japan exploration grows very well; this tree is definitely better than the type due to its denser branching habit. Cleyera ochnacea, another tree from the same expedition I believe, does not perform at all. Probably heat. I asked, and received Pinus canariensis; too early to comment, but they survived the first year.

Magnolia guatemalensis survived all the cold we had, but does not like the daily rain during our two rainy seasons.

Introductions from my collection:

Xerophytes and/or mesophytes collected in west Texas and Mexico grow very well, if they have good drainage. Planted in large planter-boxes they perform excellently. F. ex.: Mimosa biuncifera, Acacia rigidula, Acacia cornigera, Lippia ligustrina, Bauhinia mexicana and a few more."

Vegetable Crops. E. P. Barrios, Louisiana Agricultural Experiment Station, Baton Rouge, La.

Capsicum chinense

152222	Appears to fruit too late in the season for our area.
152225	Looks very good for virus resistance. It is a purple chile, however, and both pod shape and color are not desirable for our main purpose, which is incorporation of resistance into a tabasco type pepper.
152452	Promising for virus resistance. A pendant green chili pod. Some tabasco type pods can be obtained from crosses.

Capsicum pendulum:

152217	Fruits too late
157234	Fruits too late.

One accession, 264281, a cayenne type, looks very good in small plot trials in Baton Rouge and will be planted on a larger scale in 1968.

1966 - 1967 Report

Regional Project S-9 New Plants

Contributing Project 470

Mississippi

Workers with the Agricultural Experiment Station, U. S. Department of Agriculture, and private individuals received 325 plant introduction accessions during the 1966-1967 year. All of these were used in plant breeding or disease resistance studies. Over half of the accessions were used to help establish the host range of corn stunt and maize dwarf mosaic viruses.

Domestic fruit plant explorations have been made throughout a number of counties in south Mississippi and budwood of many selections were sent during several winters to Louisiana State University for propagation and testing by the Louisiana Horticulture Department.

Some of these selections have also been propagated and placed in the experimental orchards at State College to study their performance in this area. At this time, there are 25 apple selections, 15 plum, 10 pear, and 2 crab apples growing in the test orchards at State College. Several fig selections were tested but none proved winter hardy for this area.

Several of the selections marked in counties in south Mississippi have not been successfully propagated and plans will be made to complete propagation during the next dormant season.

The Rubus breeding program at Mississippi State University has utilized species which were originally imported by the U.S.D.A. Plant Importation program. Two of these from Asia, Rubus parvifolius L. and Rubus kuntzeanus Hemsl. are in the parentage of one selection which is being proposed for naming and release to growers. Both of these species have adaptation to heat and drought typical of the southeastern part of the United States. Plants of Rubus strigosus, the native, northern red raspberry of the United States along with Rubus idaeus from Europe are not adapted to southern growing conditions. Fruit characters of the American and European species have been combined with vegetative characters from the Asian species to produce selections with good fruits and adapted in this geographical area.

A blackberry variety from a cross of the European Himalaya berry and a native American variety, Taylor, was named Williams. It is a semi-erect variety with good, southern adaptation.

NORTH CAROLINA - NEW PLANTS PROJECT

Report to S-9 Technical Committee, College Station, Texas, July 18-19, 1967

Five cooperators received 59 plant introductions from July 1, 1966 to July 1, 1967. These introductions along with others received in prior years are being evaluated. Many introductions have been incorporated into the various breeding programs and are now in various stages of advanced testing.

I. Varieties or strains released by the North Carolina Experiment Station in cooperation with the USDA.

TH 149-8 and TH 149-20, Non-Commercial Breeding Stocks of Cotton.

These stocks were derived from a tri-species cross (*Gossypium arboreum* x *G. thurberi* x *G. hirsutum*) originally reported by J. O. Beasley in 1940. This original hybrid was backcrossed repeatedly to commercial varieties of the *G. hirsutum* species with several generations of selfing and selection interspersed between each backcross. A BC_4 strain developed by Dr. Thomas Kerr and designated as TH 108, was crossed with Rowden to produce the fifth backcross generation to *G. hirsutum*. Empire 10, a line from the Variety Empire, was used as the recurrent parent for two additional backcrosses. TH 149-8 and TH 149-20 are progenies of individual F_6 plants (tracing to a common F_3 plant) of the BC_7 generation.

TH 149-20 has been fairly widely tested. Relative to commercial check varieties it is noteworthy for its combination of acceptable yield and excellent fiber properties, particularly its fiber tensile strength (T_1) and 22's yarn strength. This strain has large bolls, large seed and relatively low lint percentage. Staple length is slightly longer than that of the check varieties and Micronaire fineness slightly less. Fiber elasticity (E_1) is relatively low. Fusarium wilt reaction appears to be intermediate and is considered to be satisfactory for all but the most heavily infested soils in the Southeast.

Only limited data are available for TH 149-8. It appears to be very similar in performance to TH 149-20 as might be expected since both stocks trace to a common F_3 progenitor plant.

Both lines have vigorous vegetative growth from the seedling stage onward and produce mature plants which are above average in height. Open bolls appear to have good storm resistance and to be well adapted for spindle-type machine harvesting.

Small amounts of seed were made available to public and private breeders on March 3, 1967.

II. Plant Introductions of Special Interest

Pigeon Pea PI 218066

The pigeon pea, Cajanus cajan is a legume that will soon be suggested as a replacement green manure crop for the banned Crotalarias. The strain of pigeon peas showing promise in North Carolina is a seed increase from a USDA plant introduction from Pakistan, PI 218066. It is grown as an annual from seeds, reaches a height of from four to seven feet and outyields Crotalaria. The plant flowers in late August, and if planted early produces a fair seed crop. The seed are larger than common vetch and smaller than soybean seed and are nontoxic.

Pigeon peas are resistant to the two main North Carolina root knot nematodes: Southern, M. incognita and Northern, M. hapla. They also show some resistance to two other root knot nematodes M. javanica and M. arenaria. They are however susceptable to the lesion nematode, Pratylenchus.

Pigeon peas show more promise in North Carolina as a green manure crop than does hairy indigo because the plants emerge quicker, grow faster and are more resistant to nematodes. Acre demonstration plots were seeded in eight counties during 1966. County agents and farmers seeing these plots were impressed and are interested in obtaining seed.

Seed availability is the one thing holding up the release of this plant introduction as a new variety. The seed yield at the Jackson Springs Station in 1965 was 400 pounds per acre; in 1966 only 200 pounds per acre. The plants flower too late in most of the state to give us the high yields reported in other areas, up to 5000 pounds for example in Hawaii with a ten month growing season. The potential yield is there because the plants flower profusely under our conditions. The amount of time between flowering and frost however is too short for proper seed set. The plants flower due both to the day length factor and earliness of planting.

A twelve-acre seed increase plot is being grown at Jackson Springs this year. Seed plots are also established in Currituck, Dare, Onslow and Brunswick counties, near the sound or ocean to determine if there is a better seed producing area in our state than the sandhills. Seed has also been sent to cooperators of Regional Project S-9 in Alabama, Georgia, Florida, South Carolina and Texas.

Enough seed of the pigeon pea strain PI 218066 should be available in 1968 for demonstration plots for all interested extension and soil conservation personnel.

III. Domestic Plant Exploration

The domestic collection of Eastern Vaccinium species for use in the Southeast, approved by S-9 is now underway. On a trip to the West Virginia-Virginia border area from July 25-29, 1966, Drs. Bell and Galletta collected 23 herbarium specimens, 260 softwood cuttings of 8 species and seed of ten accessions of six species. On a trip through Florida and

South Georgia from May 20-25, 1967, Drs. Galletta, Knight, Sharpe, Snow, and Faircloth collected herbarium specimens, cuttings or seed of 59 accessions. Summaries of these trips have been sent to Bob Langford. Dr. Galletta has just returned from a second trip to the Florida, South Georgia area and does not have his trip summarized at this time. These trips have provided many accessions that will enhance the Vaccinium breeding programs in the Southeast.

IV. Foreign Plant Explorations

Dr. Gregory collected additional peanut introductions in Northeastern Brazil during March, 1967.

Dr. Timothy collected 14 accessions of Tripsacum and related species in Bolivia and Peru. He also collected a few accessions of cotton and peanuts in the same areas. Most of these accessions have been assigned PI numbers.

Drs. Phillips and Stephens collected 150 accessions of exotic cottons in Colombia, Ecuador, Peru and Argentina.

V. Requests for Plant Materials to be Collected on the Collecting Trip to the Soviet Union Starting in August

Dr. D. L. Strider, Mountain Horticultural Station, Fletcher, North Carolina

Lycopersicon material from Russia or any other country in that vicinity (particularly from Bulgaria) which is resistant to bacterial canker of tomato.

K. N. Yatsynina from the Soviet Union and E. Elenkov from the Institute for Vegetable Culture "Mariza", Plovdiv, Bulgaria have developed resistant varieties to bacterial canker. Seed of these varieties would be appreciated.

Dr. D. C. Zeiger, Mountain Horticultural Station, Fletcher, North Carolina

Apple rootstocks, particularly, rootstocks which would dwarf trees.

Rootstock resistant to mouse feeding.

VI. Evaluation of Potential Industrial Crops, Pulp Crops and Other Crops

A. Kenaf - paper pulp

A plant spacing test was seeded at four rates in 7, 14, 21, and 28 inch rows. In-the-row spacing from only three of these rates 2, 3, and 4 plants per row foot were compared.

1. Dry matter yields were low for 1966 due to a 30 day drought beginning June 30.

2. Highest dry matter yields, 6.63 tons per acre, were obtained in 14 inch rows as in past years.

3. The lowest dry matter yields, 4.70 tons per acre, were obtained in 7 inch rows. The plants were the shortest and the stems the smallest in these plots.

4. Highest dry matter yields were obtained at the lowest seeding rate in the 14 inch rows and at the highest seeding rates in the 21 and 28 inch rows.

5. Plant heights and stem diameters were greater at the lower densities within each row width and increased as row width increased.

6. Applications of nitrogen at four rates decreased dry matter yield, plant height, and stem diameter under the dry conditions of this test.

B. Tephrosia vogelii - source of rotenone

Two - two acre pilot tests comparing two lines, a plant spacing test of 1, 2, 3 and 4 square feet per plant in 12, 24 and 36 inch rows, a breeding line spacing test, and a greenhouse test evaluating nematodes were evaluated in 1966.

1. All lines germinated well on a sandy loam soil.

2. Tephrosia breeding line 6285 gave the highest dry matter yield and percent rotenone of any lines tested.

3. Earlier May plantings of breeding line 6285 gave twice the dry matter yields of an early June planting.

4. The highest dry matter yields, 6.00 tons plus per acre, were obtained at a 1 square foot spacing in 12 and 24 inch rows and in the 2 square foot spacing in the 24 inch rows.

5. The highest leaf to stem ratio, 1.38, was at the one square foot spacing in 12 inch rows.

6. Tephrosia is extremely susceptible to root knot and lesion nematode.

7. Five plants of three breeding lines that were flowering at frost were brought into the greenhouse. These plants are now flowering and some seed has been collected.

C. Mentha arvensis - source of menthol

Seven strains of M. arvensis var. piperascens were tested in 1966. Two of these strains yielded well. Tests for menthol were low, however. Plants survived the winter provided some top growth provided ground cover. A larger planting was put out this year from greenhouse material.

D. Sunflowers - oil and wild birdseed

Variety tests comparing 18 varieties, six of them high oil varieties from Russia were grown at two locations. The large black seeded variety, Commander, from Canada gave the highest yield, 1178 pounds, per acre in a very bad year. Bird damage was severe in the oil seed types. This damage occurred while the heads were still green, therefore, they could not be harvested for yield. The birds caused only minor damage to the larger seeded Mennonite and Greystripe lines even though they were harvested late. Many plants had no seed heads. The growing point of these plants was malformed at an early stage of growth, from one to three feet tall, and no flower or a deformed flower was formed. The later maturing varieties are more susceptible to this damage by what I think is an insect. The injured plants grow to a normal height and offer much competition to normal plants. Various treatments are being evaluated this year in an attempt to find and/or control the insect.

E. Euphorbia lagascae - oil

Seed was planted in 7, 14, 21, 28 and 35 inch rows and plants were thinned to 2, 4, 8 and 12 plants per row foot. Stands were excellent. Plants were 10 inches tall on July 12, 13 inches tall on July 19 and 18 inches tall on August 8. Plants started to die at this time. No flowering on any of the plants. The disease was unidentified. By the end of the season only a very few plants lived. No seed present for harvest.

F. Brassica carinata - oil

Seed was planted in 7, 14, 21, 28 and 35 inch rows and plants were thinned to 4 and 8 plants per row foot. Stands were excellent. Plots were very variable in height averaging 28 inches on July 12, and 42 inches on July 17. Plants were flowering profusely in August. Plants did not set seed however and no seed was harvested.

G. Vernonia anthelmintica - oil

Seed was planted in 7, 14, 21, 28 and 35 inch rows and plants were thinned to 4 and 8 plants per row foot. Stands were only fair. Plants with only average vigor were very variable in height averaging 14 inches July 12, 18 inches July 19 and 30 inches on August 8 with flowering. Seed was not harvested because of very low yield potential.

Five PI's 225851, 263368, 283729, 292522 and 304905 were evaluated in 35 inch rows. Plots were not harvested because potential yields were low. PI's 263368 and 283729 were low growing with seed distributed all over the

plant. Yield potential of these lines were the best in the test.

A crop like Vernonia will not be acceptable to North Carolina farmers.

H. Other crops

Crambe, Cassia, sugarbeets, sorghum, dry peas and beans, castor-beans and ornamentals are also being evaluated at various locations in the State.

VII. Work for 1967 and 1968

All the above crops are being evaluated again this year with the exception of Euphorbia, Brassica, and Vernonia.

Summaries of those crop varieties released in North Carolina since 1961 with PI's in their parentage were prepared for incorporation into a six-year progress report for S-9.

ANNUAL REPORT ON NEW CROPS (S-9) RESEARCH IN OKLAHOMA

College Station, Texas, July 18-19, 1967

Roy M. Oswalt and Ralph S. Matlock

Accessions of oilseed, pulse, sugar, and gum crops were evaluated in 1966 and 1967 except for the sugar crops.

The pulp crops were not planted in 1966 and 1967.

OILSEED CROPS

Crambe abyssinica. P.I. 247310 (Sp-76) was planted near Stillwater in 1966. Seed yields were less than 500 pounds per acre mainly due to aphid damage. In 1967, 12 accessions were planted near Stillwater. The planting looks good in spite of a severe hail storm.

Sunflower. The 1967 regional test received severe hail damage when the plants were about 12 inches tall. Some recovery was made but the damage will prevent using it for a yield test.

Vernonia anthelmintica. P.I. 283729 (Sp-263) and nine selections therefrom were grown near Stillwater in 1966. The lack of rainfall during late June and most of July caused yields to be very low.

Castorbeans. Seed yields have been excellent under irrigation near Goodwell. Since the area of adaption and strains adapted have been determined for Oklahoma it was decided to discontinue the tests until commercial production increases in the state.

Others. Three accessions of Anethum graveolens (P.I. 288283, 288284,288283), and of Coriandrum sativum (P.I. 288325, 288735) were planted in 1966 near Stillwater, but little or no seed was produced. Euphorbia lagascae (P.I. 296064 Sp-543) produced vegetative growth and blooms but no seed. The plants were not killed until the temperature dropped to 20°F. Euphorbia heterophylla (Sp-104) continued to produce a good seed crop but it shattered readily.

PULSE CROPS

Chickpea, Cicer arietium. In 1966 and 1967, 23 accessions of chickpea were planted (March 6, 1966) near Stillwater. The 1966 test was harvested July 11, 1966. Seed yields ranged from 78 to 490 pounds per acre. Accessions producing above 300 pounds per acre included P.I. 250143 (Cp-94)

P.I. 253228 (Cp-143), P.I. 254548 (Cp-145) and P.I. 254547 (Cp-144). The seed size ranged from 10 to 32 grams per 100 seed.

Field peas, Pisum sativum. Nine varieties and four accessions were planted March 6, 1966, near Stillwater. The test were harvested June 22, 1966. Results indicated that P.I. 257593 (Sp-134) and P.I. 257592 (Sp-126) have good yield potential.

Pigeon Peas. Three varieties and one accession (P.I. 218066, Sp-46) were planted near Stillwater in early March. The varieties Kaki, Totiempo, and Saragateode bloom too late to produce seed. The accession continues to give the best performance. We have about 16 pounds of seed of Sp-46.

Field beans, Phaseolus vulgaris. Ten varieties and strains and 16 accessions (for increase & observation) were grown either near Goodwell or Stillwater. The varieties produced good yields near Goodwell test but very poor yields near Stillwater.

Indianbean, Phaseolus latifolus (Sp-222) continued to produce excellent yields both near Stillwater and Goodwell.

Adzukibean, Phaseolus angularis. Three accessions (Sp-313, Sp-416, and Sp-768) produced seed yields ranging from 215 to 420 pounds per acre. The seed size ranged from 9.2 to 11.6 grams per 100 seed.

Mungbean, Phaseolus aureus. Thirteen accessions and seven selections of Mungbeans were grown for observation and increase in 1966. None of the 13 accessions exceeded the seed yield of Berken. Seed of P.I. 226658 (M-885), P.I. 217953 (M-868), P.I. 197019 (M-886), and P.I. 223710 (M-890) did not germinate. The yield and seed size were as follows:

Okla. M-No.	P.I. No.	Yield (lbs/A)	Seed weight (gms/100)
339	Berken	775	5.6
844	220304	20	3.4*
858	229707	87	2.8*
881	305413	361	4.2
887	214334	393	4.8
888	217956	80	2.8*
889	217957	280	3.8
891	223522	100	3.9
892	220108	20	2.6*
894	223523	265	3.8

* Very poor stand.

Urd bean, Phaseolus mungo. Twelve accessions of Urd beans were evaluated in replicated test at Perkins in 1966. P.I. 288603 (M-788) and P.I. 174907 (M-897) did not produce seed. M-749, M-785, and M-787 had excellent seed yields. The seed of M-749 and M-130 were very large. The mean seed yields and seed size follows:

Okla. M-No.	P.I. No.	Yield (lbs/A)	Seed Weight (gms./100)
130	212909	386	5.6
745	269522	300	3.9
748	270058	168	3.7
749	271497	597	7.2
784	288599	293	4.1
785	288600	573	4.2
786	288601	413	4.7
787	288602	557	4.0
831	288834	309	3.6
832	288835	310	3.6

Urd beans accessions with sufficient seed were planted in plots near Perkins, Stratford and Mangum in 1967.

Kulthi bean, Dolichos lablab. Only two of the eight accessions planted matured to seed, P.I. 288466 (Sp-388) and P.I. 288467 (Sp-389) in 1966. Those that germinated poorly and/or matured late include P.I. 288468 (Sp-390), P.I. 288469 (Sp-391), P.I. 288470 (Sp-392), P.I. 288471 (Sp-393), P.I. 288472 (Sp-394), and P.I. 288473 (Sp-395).

Fenugreek, Trigonella foenum-graecum. Three accessions were evaluated. The plants measured 8 to 12 inches tall and produced 40-67 grams of seed in small two-two plots. P.I. 288651 (Sp-348), P.I. 288652 (Sp-349) and P.I. 288654 (Sp-351) were very similar in performance.

Cowpea, Vigna sinensis. Thirty-nine cowpea accessions were screened in the fusarium wilt nursery in 1966 and eight were included in the 1967 test. Results for the nine accessions were planted in replicated tests near Perkins in 1966 follows: Seed yields for P.I. 194202 (C-700), P.I. 208845 (C-703) and P.I. 221731 (C-704) were very good.

Okla. C-No.	P.I. No.	Yield (lbs/A)	Seed Weight (gms/100)
629	124609	960	14.0
660	288664	700	12.8
661	288665	790	12.8
662	288666	630	14.8
699	190191	810	12.0
700	194202	1125	12.8
703	208845	1225	18.1
704	221731	1140	11.0
711	293514	830	14.4

Peanuts, Arachis hypogaea. In 1966, 140 peanut accessions were grown for observation and increase or for agronomic, physical, chemical, and organoleptic evaluation. Forty were grown for seed increase near Perkins. Ten accessions were included in the Spanish Regional Variety Test near Perkins and Stratford. P.I. 248759 (P-548) and P.I. 259800 (P-930) had yields slightly higher than the check varieties. Sixteen Valencia accessions were evaluated in replicated tests. P.I. 261940 (P-516) and P.I. 268831 (P-748) gave good performance for Valencia. Seventy-four accessions were in the final stages of evaluation in replicated tests near Perkins and Ft. Cobb. P.I. 240561 (P-560), P.I. 268601 (P-567), and P.I. 268761 (P-768) had high yields and grades and rated well in the organoleptic quality of the roasted peanuts.

In 1966 and 1967, 480 accessions,selections and varieties were screened in field tests near Perkins for their resistance to thrips in cooperation with the O.S.U. Department of Entomology and the United States Department of Agriculture. In 1966, 24 accessions showed moderate resistance to thrips. These are being further evaluated in greenhouse tests. These data indicate that there is genetic diversity in the germ plasm with respect to thrips resistance.

Lentil, Lens culinaris. Four accessions were planted for observation and seed increase in 1966. The plants grew 5 to 7 inches tall before maturing. P.I. 305415 (Sp-480) was the most productive and yielded about 230 pounds of seed per acre. A small amount of seed was produced for P.I. 193547 (Sp-297), P.I. 193817 (Sp-298), and P.I. 193550 (Sp-299).

MUCILAGE CROP

Guar. Tests were conducted on stations near Perkins, Stratford, Mangum, and Tipton in 1966 and again in 1967. Forty varieties, accessions, and selections in replicated tests near Perkins averaged 814 pounds of seed per acre in 1966. Seventy-three plant progeny rows were grown in 1966 for seed purification of Texsel, Brooks, Mills and Hall. Sixty-eight lines selected from natural hybrids were also evaluated near Perkins. Seed of the wild species, Cyamopsis senegalensis and C. serrata were increased. The wild species shatter readily, but appear to be free of disease.

ANNUAL PULP CROPS

A sorghum line resulting from the cross, Sorghum niloticum X Sart sargo appeared to show promise for pulp. The plants were characterized by high yields, tall plant, minimum pith and few leaves. The Northern Utilization and Development Personnel have kindly consented to evaluate its pulp potential. It appears to be more productive than any of the pulp crops tested.

The only other pulp crops evaluated agronomically include Okra.

SUGAR CROPS

Sugar Beets. The 1966 tests at stations near Goodwell and Tipton, completed a series of tests to evaluate the potential of sugar beets for Northwestern and Southwestern Oklahoma.

Thirteen entries in 10 replications at Goodwell averaged 23.5 tons per acre of roots, 13.18 per cent sucrose and averaged 6220 pounds per acre of sucrose.

Six entries in 10 replications near Tipton averaged 20.4 tons per acre of roots that contained 15.18 per cent sucrose.

University of Puerto Rico
Mayaguez Campus
AGRICULTURAL EXPERIMENT STATION
Plant Breeding Department
Rfo Piedras, Puerto Rico

ANNUAL REPORT
NEW CROPS RESEARCH IN PUERTO RICO
July 1966 to June 1967
S-9 Technical Committee Meeting at College Station, Texas
July 18-19, 1967

This was an extremely dry year in Puerto Rico particularly the period from January to June 1967. This situation obviously handicapped the establishment of field plantings.

A total of 503 introductions were received by the Agricultural Experiment Station. According to their economic use these can be grouped as follows: sugar crops, 179; forages, 92; forage legumes, 7 ; fruits, 18; vegetables, 159; grains, 16; ornamentals, 28; and miscellaneous, 4.

Most of these are under evaluation at present, and, in the case of fruits and forages, this process will take some time. Following is an account of the observations made during the year.

Sugar crops:

The evaluation of sugar beet varieties continued. A variety from Michigan, (SL 126 MS x 128) MS x SP 5822-0 showed more resistance to *Cercospora* than varieties Cercopoly and Cercerave as in contrast with last years results.

This may be due to the existence of physiological races of the organism or to a difference between European and American varieties as to the source of resistance, thus behaving differently under a given set of environmental conditions.

Forage grasses:

Evaluation of forage grass introductions continued at various locations.

At Rfo Piedras *Digitaria milanjiana* 299699 and the A-24 *Digitaria* from Taiwan look most promissing among 29 *Digitarias* being compared with Pangola.

In a trial conducted at the Gurabo Substation, *Panicum maximum* accessions 259553 and 259568 outyielded Guinea, Pangola, and Buffel among other grasses. The two new grasses outyielded Guinea by over 30 percent.

In the interior mountainous area studies for the evaluation of Star Bermuda grass (*Cynodon plectostachyus*), and Congo grass (*Brachiaria ruziziensis*)

247404, are underway. These are very promissing forages for these area, although Star grass presents some toxicity problems which have to be elucidated.

Most of the grass accessions, in majority Digitarias have been established at the Lajas Substation and in the near future they will be planted at the southwestern area of Puerto Rico for evaluation of their behavior under dry and saline conditions.

Studies on breeding behavior of the most promissing Digitaria accessions are also underway. In caryopsis studies of 29 Digitaria accessions, conducted during the year, D. setivalva 299804, D. milanjiana subspecies eylesiana 299736, and 299703, and D. smutsii 299808 have shown the highest rate of germination, and seedlings are growing in order to determine their origin, whether sexual or asexual. These accessions may be come valuable parental material in Digitaria improvement. In addition to the above mentioned species, these studies involved D. milanjiana, D. valida and D. pentzii.

Fruits:

Banana varieties Altafort, High Gate, Paggi, Giant Governor and 2390 under evaluation at Adjuntas fruited, and bunches harvested from some of them.

In Altafort the fruit compares favorably with that of Gross Michel as to size, shape and quality. It is susceptible to Sigatoka disease, but it seems to have some resistance to Panama disease.

High Gate and Giant Governor are very susceptible to Sigatoka, and do not offer any possibilities as new varieties for Puerto Rico.

Paggi is highly resistant to Sigatoka but the fruit is poor in quality for fresh consumption. However, it is considered very good for consumption when boiled as a vegetalbe by some who have tried it.

Introduction 2390 is fairly tolerant to Sigatoka, and its fruit although smaller than that of Gross Michel, compares favorably with it as regards quality.

Grape variety studies have continued at the Fortuna Substation. The first crop yield data are being collected from six promissing varieties, Ribier, Exotic, Lake Emerald, Tamiami, and California Selections S-91-59 and S-92-49. From what can be observed at present, it looks as if Lake Emerald and Ribier have the hearviest load of fruit.

At Adjuntas, crop yield data is being collected for the evaluation of yellow passion fruit and annato selections, P.R. 1, 2, and 5. Studies conducted during the year indicate that yellow passion vines do not require severe prunning.

At Isabela, guava windbreaks proved most favorable for passion fruit production, as in contrast with unprotected plantings, this indicating the need of protection against wind. Fruit was harvested starting at the seventh month after planting, and throughout a period of six months from August to January. The average monthly yield per acre was 1200 pounds, with a peak of 3000 pounds in the month of December.

The guava pineapple, Feijoa sellowiana Perg. flowered profusely at Adjuntas for the second year, but fruit set was a complete failure as occurred last year.

The date seedlings about 7 years of age have attained a height of about 8 feet and about half of the plants have bloomed and their sex determined. The female plants which bloomed during January and February were hand pollinated and at present 25 of them are in production with a total of 84 bunches with an average weight of 15 lbs. per bunch.

The planting of sapucaia nut established 7 years ago is growing vigorously and has attained a height of about 10 feet. About 50 percent of the trees have produced crop, and flowers and fruits can be observed throughout the year.

Some Macadamia trees are bearing fruit at Fortuna. This year only a few trees bloomed in March. Sapodilla, Achras sapota, planted about 4 years ago produced a small crop harvested last March.

Soursoup planting is growing satisfactorily and some trees are in production at present.

Ornamentals:

Among the introductions of ornamentals Osmanthus heterophylus P.I.242238 is showing very good adaptation to our conditions both when planted in pots as well as on the ground. It seems to be of value as ornamental.

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1967
S-9 Report from South Carolina

J. A. Martin

There were 3,364 P.I. accessions of seeds and plants distributed to eleven cooperators in South Carolina since July 1, 1966. These accessions included ornamentals, vegetables, and a few miscellaneous crops. Most of the cooperators are testing and evaluating for insect and nematode resistance as well as for other desirable characters which may be of value in mechanical harvesting.

Reports from various cooperators are presented as follows:

Dr. W. C. Barnes, Superintendent, Truck Station, Charleston, South Carolina 29407

The Poinsett slicer cucumber released in 1966 continues to receive warm praise for its disease resistance, productivity and fruit color. The one undesirable feature is slightly short fruit, especially under adverse conditions early in the season. P.I. 197087 and 220860 went into the breeding of this variety.

Cherokee and Gemini hybrids released in 1967 are also receiving favorable comment. The same 2 P.I.'s went into their development.

Two pickles, Southern Cross and Pioneer, were in trial plantings last year and in fair volume this year. Both promise to make a real contribution to this industry. The following P.I. went into their breeding - 197087, 220860 and 196289. Four new pickle lines have been sent to the western seed growing areas for increase and we anticipate the release of one in early 1968.

All of our new cucumbers have resistance to downy mildew, powdery mildew, angular leafspot and anthracnose. Some of the pickles also have tolerance to cucumber mosaic virus.

Work continues on the development of downy mildew resistant broccoli using P.I. 189-28 and cabbage using 261774.

The gynoecious parent of the slicer hybrids is Gy 54 and that of the pickle Gy 3. The resistance of Gy 54 is the same as Poinsett and Gy 3 the same as the Southern Cross hybrid.

Dr. O. L. Chambliss, Research Horticulturist, U.S.D.A. - A.R.S.
U.S. Vegetable Breeding Laboratory, Charleston, South Carolina 29407

Subject: Evaluation of Plant Introductions for Insect Resistance

In our search for sources of resistance to the banded cucumber beetle (Diabrotica balteata) several single plant selections were obtained from the following plant introductions:

Cucurbita pepo, 216032, 230181, 267660, 269483, and 274787;
C. maxima, 162890, 165558, and 296483-B;
C. moschata, 217947;
C. mixta, G-6170; and
C. texana, 285213.

Of the Cucumis melo plant introductions screened for D. balteata resistance 362 had some degree of resistance and 25 of these had a high degree of resistance. These were:

127524	175109	164343	271329
134200	182937	164720	271335
136169	183055	164750	295341
136198	210541	211933	302446
136225	210542	212895	
149168	164330	223772	
163219	164331	249560	

Screening of the other plant introductions we obtained (watermelons and cowpeas) is not completed and we shall report any useful information obtained at a later date.

Dr. William C. Frierson, Frierson's Flowers, Denmark, S. C. 29042

Two plants which we think a lot of are: Raphiolepis umbellata and Osmanthus Ilicifolius.

The former we have started rooting cuttings and have planted seeds, but none are up yet. It is a broadleaf evergreen for mild climates. Has fragrant flowers and is broad shaped.

My sons like the latter so well that they use it up in landscaping before I can get it grown. It is a tallish dark evergreen with holly-like leaves.

J. P. Fulmer, Assistant Professor, Clemson University, Department of Horticulture, Clemson, S. C. 29631

Woody ornamental plant introductions have attracted much attention at Clemson from nurserymen, landscape contractors and the public. After several years of observations, many species are beginning to show their true growth habits. The temperature extremes of 1963, 1964, 1965 and abnormal 1966-67 season has eliminated the less hardy species.

The following accessions are worthy of continued evaluation and some are being or will be propagated for distribution to interested parties.

P.I. 267824 Ilex "Lydia Morris" and P.I. 267825 Ilex "John T. Morris" are both hollies which exhibit upright habit of growth. Both varieties are faster growing than their I. pernyi parent. Lydia Morris is the pistillate plant, but has produced few berries to date. Both varieties are worthy of introduction into the nursery trade.

P.I. 142294 Quercus accutissima was introduced to the Clemson Station in 1958. Seed were planted at that time and we now have a tree 20 ft. tall. A fast growing oak should have use for landscape purposes. The oak tree holds the majority of its leaves all winter.

The Hirada azalea varieties were introduced at Clemson in 1965. Most have withstood our adverse winters; however, they have not bloomed successfully until the spring of 1967. A few varieties are apparently superior to similar ones in the trade.

P.I. 226147 is a Satsuki azalea type which is upright in growth habit and produced white, pink and variegated flowers on the same plant. The plant will be propagated this year. 228108 is another Satsuki type which is outstanding.

P.I. 279405, 406, 408 are Belgian-Glendale azalea crosses which have shown good color and growth characteristics in the greenhouse.

P.I. 242241, Osmarea barkwoodi, is a slow growing plant similar in leaf size to Japanese holly. This plant bloomed for the first time in 1967, but the blooms were killed by a late frost. This is apparently a good plant for semi-shade.

P.I. 296011, 013, 015 are Alnus species which were received in 1965. Several are now 10 ft. tall with a spreading upright habit of growth. Indications are a fast growing tree. Specimens have been planted in the open field for further evaluation.

P.I. 296026, Stachyurus praecox, is a very interesting plant. It was received in 1965, but did not bloom until 1967. It is very straggly with growth habits similar to Forsythia. The few flowers produced were unusual. The racemes were orange-yellow in color. The commercial value is doubtful.

Collections of camellia species are being maintained. There is much variation in leaf color and flowers. There are also some late bloomers which may be promising.

The Ilex crenata accessions are beginning to exhibit their true growth habits. The most interesting are the horizontal branching types. Some specimens will be moved to the open fields.

P.I. 227484, I. rugosa, a pestillate plant, is a semi-dwarf species with red berries. The species has withstood our adverse weather and may have commercial value.

Dr. M. B. Hughes, Horticulturist, Edisto Experiment Station, Blackville, South Carolina

Redcliff, a new sweet potato, named and released for 1967 growing season.

A. Parentage

1097-63 was first grown from true seed in 1960. It arose from a cross of CaroGold with 381. 381 itself was the result of a cross of 587-54 with P.I. 153655, better known as Tinian, a red-skinned potato of extremely poor quality but of very high wilt resistance. 587-54 was a gold-skinned potato which arose as an open-pollinated seedling of 63-6, a potato exceptionally uniform and beautifully shaped but with high susceptibility to wilt.

B. Description

1. Plant type - a vigorous semi-bunch type vine; slightly cut leaves; green stems; purple on under veins of leaf.

2. Roots - blocky, red-skinned root with deep uniform salmon flesh; good to excellent baking quality; canning quality reported by Cribb and Sons, Tabor City, N.C., to be as good as any they have canned in quality, uniformity of color and ability to hold up for long periods after processing.

3. Disease resistance - resistant to root symptom expression of the internal cork virus complex; or resistant to fusarium wilt.

4. Maturity - earliness about with Centennial can be set later than Centennial; it appears to have about the same yield potential as Centennial when set early and will often outyield Centennial, if set in June or early July. Since it does produce a considerable number of Jumbo grade roots, canners should set it close in the drill and keep it under observation in order to harvest before it exceeds the desired size.

C. Comparison with Centennial

The shape is superior, since it tends to be more blocky, never producing excessively long roots; sprout production is about the same as Centennial, yield of early set plants about the same; late set plants outyield Centennial; does not produce the high number of light colored and white roots which Centennial does; the canned product is equal in color to the better Centennial packs and the product does not break down in the can as does Centennial; both varieties are quite resistant to cracking.

D. Adaptability

It has been tested only in the Blackville and Horry County areas in South Carolina and the Tabor City area of North Carolina.

Cantaloupes

We believe the following to be resistant to the particular cantaloupe virus which we have in our field, presumably cucumber mosaic. (These were inoculated.)

P.I.'s 124440, 116736, 136173, 123681, 164825, and 126073

The following have been exposed to alternaria both in 1966 and 1967 and appear to be resistant. We are just now artificially inoculating and can give you more positive information later.

102077	145594	123187
123188	164756	165003
140471	165449	116917
93800	149168	164179
140752	126030	

J. A. Martin, Associate Professor, Clemson University, Department of Horticulture, Clemson, S. C. 29631

Tephrosia vogelii - In past years we have been testing and evaluating P.I. accessions of Tephrosia vogelii in cooperation with the Crops Research Division. The results of this work have been published in CROP SCIENCE, Vol. 7, March-April 1967, p. 93-95. The title is "Rotenoid Content and Growth Characteristics of Tephrosia vogelii as Affected by Latitude and Within-Row Spacing" by D. K. Barnes, R. H. Freyre, J. J. Higgins, and J. A. Martin.

ABSTRACT

Four varieties of the tropical legume, Tephrosia vogelii, a source of the natural insecticide rotenone, were tested for one season at three locations to investigate the effect of latitude and plant spacings on several growth characteristics and on total rotenoid accumulation in the leaves. Planting locations included Mayaguez, Puerto Rico, 18° N; Clemson, S. C., 34° N; and Glenn Dale, Md., 38° N. Planting distances included 1 m between rows and three spacing distances (15 to 23 cm, 30 to 38 cm, and 53 to 61 cm) between plants within the row.

Rotenoid (rotenone and related compounds) accumulation patterns varied among varieties, but the relative rating of varieties for percentage rotenoid content per unit of dry weight was not influenced by planting distance or latitude. Plant growth characteristics such as plant height, leaf-stem ratio, and total yield of stems and leaves were significantly influenced by variety, within-row spacing, and location. Since these growth characteristics are associated with total rotenoid production per hectare, within-row plant spacing which provides 30,000 to 37,000 plants per hectare is suggested as the optimum planting pattern for T. vogelii. Maximum yields of total rotenoids obtained at Clemson, S. C., Glenn Dale, Md., and Mayaguez, P. R., were 82, 104, and 185 kg/ha, respectively.

Index words: Tephrosia vogelii, rotenoid content, growth characteristics, latitude and row spacing effect.

In 1966, Tephrosia vogelii accessions 6286 and 257533 were used for the planting of one acre. One-half acre was treated with Treflan at rate of 0.9 pound of active ingredient broadcast per acre. This was the second annual application of this material on same land. The

other one-half acre was untreated. Data obtained are as follows:

Date planted: May 20, 1966 - Row Spacing 42 inches
Fertilizer: 5-10-10 applied broadcast with lime spreader at rate of 1,000 pounds per acre.
Date Harvested: October 3, 1966
Two Tephrosia vogelii cultivars were planted on two separate fields as follows:
Field No. 1, Treflan Herbicide used to control weeds.
6286 - .52 acre - 2365 pounds per acre*
257533 - .31 acre - 3643 " " "
Field No. 2, No Herbicide used.
6286 - .25 acre - 3540 pounds per acre
257533 - .08 acre - 3643 " " "
*Based on oven-dry weight

Leaf-stem ratio* for both cultivars and for both fields are as follows: (Based on 20 plants per cultivar)

Field No. 1	6286	-	1.16	Plant Height - 49 inches
	257533	-	.96	" " 41 "
Field No. 2	6286	-	.78	" " 54 "
	257533	-	.93	" " 50 "

*Based on oven-dry weight

Four samples were obtained from the truck for each cultivar and for each field and sent by Air Freight on October 4, 1966 to Dr. W. H. Tallant of the Peoria Laboratory. Dr. Tallant informed me that these samples arrived in perfect condition. It appears now that all went well in getting the material to their respective destinations, etc.

6286 possessed a darker green foliage as compared to 257533.

The work is continuing this year with emphasis on a special legume inoculation and various rates of nitrogen. P.I. accession 257533 is being used for this test.

Kenaf - This crop seems to be well adapted to South Carolina. Germination is always rapid. Crop grow fast and respond to high rates of fertilizers and water. Data obtained are as follows:

Cultivar used: Kenaf B57638
Date Planted: May 16, 1966
Fertilizer: 5-10-10 applied broadcast with lime spreader at rate of 1,000 pounds per acre a week prior to plantings.
Nitrogen used as sidedressing: 200, 400, and 600 pounds of Nitrogen applied broadcast as follows:

Treatment No. 1 - 200 pound rate of nitrogen
200 lbs. applied on June 15, 1966
Treatment No. 2 - 400 pound rate of nitrogen
200 lbs. applied on June 15, 1966
200 lbs. applied on July 5, 1966
Treatment No. 3 - 600 pound rate of nitrogen
200 lbs. applied on June 15, 1966
200 lbs. applied on July 5, 1966
200 lbs. applied on August 10, 1966
Source of nitrogen was ammonium nitrate.

Row spacing: 21 inches
Harvesting Data:

Yield of Kenaf in Pounds

Treatment No.	Rep. 1	Rep. 2	Rep. 3	Lbs. per Acre*
1	35.3	58.8	50.0	23,724
2	39.1	49.6	45.0	26,071
3	61.6	40.4	82.9	35,509

*Based on oven-dry weight

Spacing of Plants in Row in Inches

Treatment No.	Rep. 1	Rep. 2	Rep. 3	Mean
1	2.2	2.9	2.9	2.7
2	2.3	2.5	2.8	2.5
3	2.7	2.3	2.6	2.5

Height of Plants in Inches at Maturity

Treatment No.	Rep. 1	Rep. 2	Rep. 3	Mean
1	134	120	136	130
2	128	136	124	129
3	142	135	150	142

This year we have a Kenaf varietal trial which includes the following: Everglades 41, 71, BG 52-75, BG 58-10, Cuba 108 and 2032, Cubano, G4, G45, and P.I. 305080 (Russian). We have an excellent stand of plants and are looking forward to a good test with this crop.

Sweet Potato Breeding - On July 1, 1966, I was placed in charge of the sweet potato breeding project. Since that time many P.I. accessions of sweet potatoes have been obtained for testing and evaluating

for use in the breeding program. Many commercial types as well as breeding lines are now included in the testing program. Research has been underway for thirty years or more. Changes in consumer's preference for sweet potatoes has created a need for a variety adapted to mechanized production and for processing. Therefore, it is planned to carry on this breeding work to develop types which are suitable for general production, processing and fresh market.

Okra - Over 200 P.I. accessions of okra have been planted for testing and evaluating for fresh pod characteristics which may be suitable for mechanical harvesting. This work is being carried on in cooperation with Agricultural Engineers who are working with various types of machines in an effort to develop some type of harvester which would be satisfactory in harvesting fresh okra pods.

Gourds - A wide collection of Cucurbita, Lagenaria, and Luffa accessions have been grown during the past three years. There is such a wide range of variation for color, shape, size, and texture of the fruits that it has been very difficult to describe them in writing. However, pictures have been taken of all the Cucurbita types as a means of preserving the descriptions. Seed from each type has been saved for future use and distribution to interested agencies. At this time the Lagenaria gourds are being cleaned and varnished for the purpose of maintaining a typical sample from each accession. The Luffa accessions are also being maintained - both seed and prints.

There has been much interest in gourds, especially for home gardeners. We have distributed almost 5,000 copies of the gourd bulletin in most of the states. Georgia seems to have the most interest.

Indigo - A number of Indigo accessions were grown at Clemson in 1966 for isolating types suitable for plantings along the Atlantic seaboard as an interest to tourists. We have had good tourist response to a few plantings at public places around Georgetown, S. C.

Dr. D. M. McLean, Research Pathologist, U.S.D.A. - A.R.S., U. S. Vegetable Breeding Laboratory, Charleston, S. C. 29407

The following watermelons (Citrulus lanatus) were tested in greenhouse for resistance to race II Colletotrichum orbiculare and no resistance was found among them:

P.I. 295850 S. Africa	P.I. 278040 Turkey
P.I. 295845 S. Africa	P.I. 278038 Turkey
P.I. 288317 India	P.I. 278037 Turkey
P.I. 288316 India	P.I. 278036 Turkey
P.I. 279461 Japan	P.I. 278034 Turkey
P.I. 279458 Turkey	P.I. 278033 Turkey
P.I. 278058 Turkey	P.I. 278032 Turkey
P.I. 278048 Turkey	P.I. 278028 Turkey
P.I. 278046 Turkey	P.I. 225559 Rhodesia

Dr. Wayne R. Sitterly, Plant Pathologist, Truck Station, Charleston, South Carolina 29407

The first virus resistant summer squash variety has been developed and released by Clemson University specialists.

Tagged the Ranger, the new variety is almost identical in fruit type with the Yellow Crookneck variety so popular in the South. It was developed out of P.I. 172870.

Ranger is up to three days earlier than commercial strains of Yellow Crookneck, and yields have averaged higher in both spring and fall crops. Fruits of the new variety have more uniform exterior color than Yellow Crookneck, and have small seed in a small seed cavity.

On another comparative note, the vigorous Ranger bush is only two-thirds the size of the bush of the Yellow Crookneck, which is an aid in harvesting, the developer points out.

Ranger is adapted to the Southern states from Virginia to Texas, and should be useful for commercial shipping and processing and for home gardens.

It has resistance to the squash mosaic virus and good tolerance to the cucumber mosaic virus, but is susceptible to the watermelon mosaic virus.

Mr. R. B. Taylor, Greer Nursery Garden Center, Greer, S. C.

I don't have much to report on new plants that I have received in the last three years. I had a freezeout on some of the Azaleas that I got from Glendale and some of the Rhododendron. Several of the large leaf Rhododendron look like they are fixing to bud up for blooming next year.

1967 ANNUAL REPORT TO S-9 TECHNICAL COMMITTEE ON NEW PLANT INTRODUCTION REGIONAL PROJECT

W. E. Roever
July 15, 1967

Tennessee cooperators received a total of 450 accessions during the first half of 1967. The bulk of these were Bermuda grass clones, plus a few ornamental trees, shrubs, and succulents.

Dr. L. M. Josephson reports that 11 new Maize introductions from Mexico were grown to recover the "hairy sheath" (Hs) character to be used as a marker gene in quantitative genetic studies. All of these were grown in a test to determine resistance to Southwestern corn borer. Only P.I. 203949 was free of girdled plants, the others had more than 60% of the plants infested. A number of introductions previously grown were also found to be free of girdled plants but these were all early and apparently reached maturity before borers had an opportunity to girdle.

Extensive studies are being conducted to determine the nature of resistance to corn earworm in P.I. 217413 (Zapalote Chico). There is some indication that resistance is associated with the low moisture content of the silks. The silks may also have a low nutritional value or have some other form of resistance.

D. E. Smith, Forest Geneticist for the Tennessee River Pulp and Paper Company, Counce, Tennessee, reported on the growing of one pound of Kenaf seed variety Everglade 71. He obtained a complete stand at approximately 8 inch spacing. Plants were about 1 1/2 inches in diameter at the ground line and approximately 12-feet tall. They were killed by a freeze in the first week of November. The Company papermakers do not feel, at this time, that this plant would be acceptable as a source of fiber for their product, kraft linerboard.

A new cooperator, Dr. B. N. Duck, at the Martin Experiment Station in West Tennessee, has received over 400 Cynodon accessions. His primary objective is to isolate adapted lines having superior forage production potential.

Among ornamentals, H. van de Werken reports as promising Rosa rugosa #227432 with dense, glossy, dark green rugose foliage. In a season most favorable for disease, the leaves were free of black spot, mildew, and other diseases. Plants set in the spring of 1966 are sturdy and upright 2 1/2 - 3 feet tall with a diameter of 5 feet, spreading by rhizomes, flowers pink, single, and hips large and few. Considered worthy of evaluation for highway banks.

Ulmus pumila #294104 set in spring of 1966 is now 10-feet tall with a 6 - 8 foot spread and a basal trunk diameter of 3 inches. The tree is vigorous, graceful, willow-like, and mobile with pinnately arranged leaves on ascending supple branchlets.

In the greenhouse Cinnamomum daphnoides #246661 has proven an excellent foliage house plant with erect to ascending habit, glossy, oval leaves 1 3/4 - 2" x 3/4 - 1", and slow-growing characteristics. After several years growth the plant has a dimension of 2 x 1 1/2 feet.

Cyanotis cristata #238684 does very well with low light intensity as a house plant.

Future work will continue along the lines of testing plants for direct adaptation to Tennessee agriculture, using plant introductions in basic research, and incorporating desirable germplasms into breeding programs.

ANNUAL REPORT ON NEW CROPS RESEARCH IN TEXAS

Hatch 717-Contributing to Southern Regional Project S-9

COLLEGE STATION, TEXAS

July 18 and 19, 1967

PREPARED BY ELI L. WHITELEY

The 1966-67 crop year was about usual for Texas. The winter and early spring were mild and dry. Late spring rains occurred over much of the state and were followed by very dry weather in the early summer.

A total of 2672 accessions were received by researchers, individuals, and commercial companies during 1966-67. Most of these plants are now growing in the field and will be evaluated during the growing season.

CROPS FOR INDUSTRIAL USES

Oilseed Crops:

All work on crambe was turned over to Dr. M.L. Kinman, ARS, USDA, who is located on our Campus. All of the selections made during the past seven years were turned over to him and he will use this material in developing a breeding program on crambe. Several selections out of P.I. 247310 were sent to Dr. J.K. Greig at Kansas State University. These selections did not perform well at Manhattan.

A seed increase was planted in the Lower Rio Grande Valley, however, yields are not available at this time.

Vernonia anthelmintica:

Several selections of Vernonia were grown in 1966, but none of these showed any promise. Seed of all plants shattered before they could be harvested.

Euphorbia lagascae:

A small planting of Euphorbia was made at College Station in October of 1966. These plants grew slowly during the fall and winter and survived a low of 16°F. These plants did not shatter as bad as plants grown from spring plantings. A small planting of Euphorbia was made at Weslaco by W.R. Cowley, his report follows.

Euphorbia lagascae (P.I. 296064) planted on September 26, 1966, germinated well but grew very slowly until mid-November. A few plants were lost to disease (pythium or fusarium) after an irrigation on December 2. First flowering was noted on January 8, 1967, when an average plant height of 36 inches was recorded. The peak bloom period occurred about January 25. Concurrent with blooming, the plants branched profusely in the tops. On March 14, seed set was very heavy and the plants, although not lodged, were pulled down by the load of terminal set seed. The central plant stems averaged some 53 inches in length.

Seed shattering is the apparent major problem of production. The seed mature unevenly and the capsules characteristically rupture

with the diurnal changes in temperature and humidity. A section of the planting was cut at maximum green seed maturity and dried on a concrete slab.

Although there was no basis for estimates of seed yield, excellent adaptation of Euphorbia is indicated. A few pounds of seed were collected for chemical analyses.

Brassica:

Several Brassicas were grown at College Station, B. hirta (P.I. 296037) and B. sinapistrum (P.I. 296062 and 296079) did not grow well at this location. Brassica carinata (P.I. 243913) was grown by W.R. Cowley at Weslaco, his report is as follows:

Planted on September 26, 1966, Brassica carinata (P.I. 243913) was quickly established in vigorous stand; by November 11, heavy central stems had reached a height of 18 inches; by December 2, the plants were more than 4 feet, heavily branched, and lodging was noted. A wide range in plant types and in maturity was evident by December 18 when first blooms were noted. Flowering was variable from that date until March 13, 1967, when 75 percent were in bloom with heavy seed set on the earlier blooming plants; 90 percent or more of the plants were lodged; standing plants were some 84 inches in height. Seed set was very heavy. Some selections were made of early maturing upright plants.

The adaptability of Brassica carinata for cool season production in the Lower Rio Grande Valley was indicated by the vigorous growth and heavy seed set. A wide range in plant types and maturity

characteristics were noted. The plants were not injured by frost; no mildew disease to which the Brassicas are generally susceptible was apparent to indicate a possible source of genetic resistance. Reselection for plant types of uniform maturity and for resistance to lodging will be needed; probably 3 maturity groups can be isolated; lodging may be correlated with maturity groups with the later and more heavily branches plants being more susceptible. Some adaption of harvesting equipment may be required or chemical dessication is indicated.

Oil and erucic acid content have not yet been determined. Some 10 pounds were hand harvested and samples can be supplied for analyses.

Several varieties of rape are being grown at Lubbock by Dr. R.D. Brigham. No results from this test have been received at this time. The varieties and their source are listed below.

Tanka - Summer rape - Brassica napus var. Annus - Canada
Target - Summer rape - Brassica napus var. Annus - Canada
Heimer - Winter rape - Brassica napus var. biennis - Sweden
Matador - Winter rape - Brassica napus var. biennis - Sweden
Victor - Winter rape - Brassica napus var. biennis - Sweden
Duro - Winter turnip rape - Brassica compestris var. biennis - Sweden
Rapido II - Winter turnip rape - Brassica compestris var. biennis - Sweden

Foeniculum vulgare:

Fennel (P.I. 268383) produced good yields in 1966. The seed were combined in July of 1966 and produced 2450 pounds of seed per acre. This crop will grow well in Central Texas and if uses can

be found for the oil it could develop into a crop for this area of the state.

Plantago ovata:

The following report was received from W.R. Cowley at Weslaco on Plantago.

Plantago ovata (P.I. 277447) planted September 26, 1966, germinated readily and by November 11 had produced rosset type plants with 12-14 very hirsute leaves that were 1½ to 2½ inches. Some flower spikes were noted above the leaf rossets on November 26; flower shoots continued to appear and two or more per plant were in flower by December 2. Peak flowering was recorded on December 20; the first mature seed were noted on January 8, 1967, and the period of seed maturity extended until mid March. Seed were produced on stems some 18 inches in height and some 2 inches above the vegetative plant canopy. As many as 140 seed heads were counted on some plants. It was observed that the later maturing plants produced the higher yields of seed. A small amount of seed was collected.

Broadcast or thickly drilled planting is indicated as a requirement for maximum yield; however, plant response to spacing was not evaluated. Selection for uniformity in maturity would be desirable. The potential of the crop would depend upon both yield level and market price.

Soybeans:

A small amount of work on soybeans was carried out at Thrall in 1966. Four varieties were grown in this test. The soybeans

developed a severe chlorosis which was found to be due to iron deficiency. Spray treatments were applied to one variety late in the season. The results were as follows:

Patterson Soybeans

Treatment	Yield, bu/A
Multi-tracin	17.6
Zinc (sulfate)	2.2
Iron (sulfate)	21.3

Yields in the variety test were as follows:

Variety	Yield, bu/A
Bragg	1.71
Hardee	7.23
Rebel	16.16
Patterson	25.20

Gum Plants:

Work with Cassia occidentalis (P.I. 292843) was closed out in 1966. Yields in 1966 were below average; production in 1966 was 1250 lbs. per acre.

Guar:

A ten entry test of guar was grown on the Stiles Farm Foundation in 1966. The results are presented below:

Variety or Strain	Seed yield, Lbs./A
Texsel	811
Groehler	920
Brooks	885
Hall	942
Mills	840
Groehler-1-1	1106
P.I. 179930-42	1180
P.I. 263875-01-5-1	894
Groehler-1-1-01-2-1-1	1028
Groehler-1-2-013-1-1	1094

A small test with three varieties planted two rows per bed was grown at Thrall in 1966. The results are presented below.

Variety	Seed yield, lbs./Acre
Brooks	1080 ± 136
Hall	1004 ± 461
Mills	1654 ± 194

A replicated test with four varieties and one P.I. is being grown at Thrall in 1967. This test includes both single and double row plantings.

Pulp Crops:

Crotalaria juncea - Texas 374: Two dryland plantings of Texas 374 were made in 1966. One planting was made in the Blacklands at Thrall, Texas and produced 4.0 tons of oven dry material per acre. The other planting at College Station produced 4.10 tons per acre.

Kenaf: The dryland planting of Everglades 71 at Thrall, Texas produced 4.67 tons of oven dry material per acre. A variety test was planted at College Station under dryland conditions. This test included eleven varieties or strains of kenaf and two Crotalarias. The average yield was 4.0 tons per acre.

SUGAR CROPS

Sugar beets continue to show promise as a crop for South Texas. Yield and sucrose content have been good in most of the tests.

Testing of sweet sorghum for sugar production has been accelerated as research indicates this crop could develop into an important crop in much of Texas. Two tests with 41 entries have been planted, one at College Station and the other at Thrall, Texas. Several tests have been planted in Southwest Texas. Yield, sucrose content, apparent purity, and other determinations will be made on samples from these tests.

FORAGE AND TURF GRASSES

Ten Cynbopogon accessions are being grown at College Station by Mr. R.R. Rhodes of the Range Science Department. These accessions were established in the Spring of 1967 and have not been evaluated.

Plant materials received by the SCS Knox City Plant Materials Center will be reported by Dr. W.C. Young.

Dr. J.P. Craigmiles of the Rice-Pasture Research and Extension Center of Beaumont reports that 291 Conchrus, 19 Chloris and 5 Paspalum introductions have been established and are under observation.

A large number of Pennisetum accessions were established by a number of commercial companies and are being evaluated this summer.

FIELD CROPS

Most of the World Collection of sorghums are being evaluated by commercial breeders in Texas. A number of these accessions are being converted to types that can be utilized in commercial varieties.

P.I. 146549, Sorghum arundinaceum, has been crossed with CK60 grain sorghum and the dwarf genes from CK60 have been successfully transferred to the cyto sterile of P.I. 146549. Seed from this cross have been made available to many institutional and commercial breeders. Dr. J.P. Craigmiles reports that official announcement of this release will be made in the near future.

The report on peanut introductions was made by Dr. A.L. Harrison. He reports that Mr. B.C. Langley made crosses of peanut introductions (P.I. 196602, 196625, and 196666) with some of his breeding material and the Starr variety in an effort to get a peanut with resistance to Cercospora leaf spot. The crosses were made by Mr. Langley at Stephenville, but the material is being grown and screened for disease resistance at the Plant Disease Experiment Station at Yoakum. The F_1's were grown in the greenhouse during the winter of 1965-66; the F_2's were grown during the summer of 1966 and selections made for possible leaf spot resistance; the F_3's are now in the field for further evaluation. Single plant selections will be made in those lines that may show resistance to leaf spot.

VEGETABLES

The report on two carrot introductions was filed by F.P. Griffiths at the Food Crops Utilization Research Laboratory at Weslaco, Texas. The variety, Kintoki (P.I. 264543), from Japan is a red variety of Darcus carota. The pigments found in the

variety were lycopene, gamma-carotene, zeto-carotene, beta-carotene, alpha-carotene, phytoene, and phytofluene. The red color of the carrot is from lycopene, 120 ug/g wet wt. This variety may have a commercial use as a blend in juice to increase the color. The amount of xanthophylls present was small, 2.8 ug/g wet wt. The pigments in Netherlands "Kokubu" (P.I. 261648) have been analyzed. The external color of this carrot was an orange-yellow color as is found in the normally accepted varieties.

WORK PLANNED FOR NEXT YEAR

Evaluation of oilseed crops will be continued in 1967-68. Major emphasis will be placed on pulp crops in an effort to push this crop closer to commercial production. Some work with sweet sorghums will be conducted in the Blackland area of the State.

PUBLICATIONS

J.P. Craigmiles. Utilization of Heterosis in Sudan-grass Breeding. Proceedings of the X International Grassland Congress, 1966.

UNITED STATES
DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FORT WORTH, TEXAS

THE SOIL CONSERVATION SERVICE REPORT ON S-9 New Crops for 1966 in Its Southern Region

By W. C. Young, Fort Worth, Tex.

Introduction

The Soil Conservation Service conducts tests with plants in its program of soil and water conservation, watershed protection, recreation, and beautification. These tests begin on plant materials centers. The Service maintains four plant materials centers in its Southern Region at Knox City, Texas; Coffeeville, Mississippi; Americus, Georgia; and Arcadia, Florida.

The testing is concluded on the sites where vegetative problems occur. These on-site tests are carried out through the soil and water conservation district program.

Plants finally proven suited are reproduced for commercial seed production by cooperators of the districts, and with crop improvement associations where possible.

This report covers the results of the tests on the centers, with Service cooperators, and in the field with soil and water conservation districts.

The Tables

Table I shows the species and accessions under test at the four Service plant materials centers.

Table II shows the accessions being increased for further testing on the centers. In some instances, items are being increased in order to have enough material to test. As an example, some of the Arachis accessions are being increased so that comparisons can be made and measured to determine if any of them have superior qualities. The characteristics that may rate the accession superior must be measured and compared before the determination can be made. Enough material was not available to do this without reproducing it. Other items have have apparent potential by direct observation.

Table III shows those items that are being increased on the centers for use in testing in the field or for the establishment of commercial seed increase fields.

Table IV shows the production of registered and other foundation seed on the plant materials centers.

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Table V shows the estimated acreage of some of the newer plants in commercial production.

A rather considerable seed industry has been developed in Texas and Oklahoma founded on the use of proven strains of range and range-like grasses. More than 1,500,000 pounds of this kind of seed was produced in Texas last year alone. Included in this production were several introductions. They include weeping lovegrass, bahiagrass, Kings Ranch bluestem, Kleburg bluestem, Gordo bluestem, Medio bluestem, Angleton bluestem and Lehmann lovegrass.

District seed increase plantings made last year include:

Lovington blue grama	20 acres	(no PI number)
Luna pubescent wheatgrass	15 acres	(Ex-PI-106831)
Jose tall wheatgrass	10 acres	(EX-PI-150123)
Largo tall wheatgrass	15 acres	(PI-109452)
Pastura little bluestem	30 acres	(no PI number)
Grenville switchgrass	30 acres	(no PI number)
Caucasian bluestem	20 acres	(PI-78758)

Amclo arrowleaf clover, one of the more recent introductions to reach the commercial market, is being offered this year by the carload lot.

Seed Certification

Chiwapa japanesemillet was accepted for certification in 1966 by the Mississippi Crop Improvement Association. An article describing its release appeared in the Mississippi Farm Research in April 1967.

Publications

Young, W. C. The role of plant introductions in Southern Agriculture. Proceedings, Association of Southern Agricultural Workers, Inc. 64th Annual Convention, New Orleans, January 30-February 1, Abstract, page 87, 1967.

Haynsworth, H. J. Dove Proso: Choice Food for Doves. Georgia Farmer, North Edition, page 5, June 1967.

Ahlrich, V. E., W. C. Young, and Morris Byrd. New Millet for Wildlife Food. Mississippi Farm Research, Vol. 30, No. 4, pages 1 and 3, April 1967.

Attachments.

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Characteristics and Status of the More Promising Plant Introductions in Soil Conservation Plant Materials Work in the South, Fiscal Year 1967

263 393 - Arachis monticola. An annual forage type peanut that looks promising as a reseeder in summer sod grasses. It is also promising as a wildlife food for wild turkeys on sandy sites. It has been grown successfully with both bermudagrass and bahiagrass. It is prostrate, and the nuts are difficult to harvest. A harvesting machine has been constructed at the Coffeeville Plant Materials Center. There are about 20 field plantings comprising about 25 acres where the reseeding quality in grass sods on the use by wild turkeys is being tested.

261 851 - Arachis burkartii. Similar to A. monticola, P.I. 263 393. Increase under way to secure direct comparison of the two.

262 839 - Arachis glabrata - Arblick forage peanut
118 457 - Arachis glabrata - Arb forage peanut
Perennial, rhizomatos peanuts but limited to sub-tropical climates. In 36 field plantings of P.I. 118 457 and three field plantings of P.I. 262 839, the 262 839 continues to show more aggressiveness and a greater rate of spread. (Field, Florida, Arcadia)

172 223 - Arachis glabrata. Produces an enormous amount of rhizomes and a lot of high quality forage. More cold resistant than 262 839 or 118 457. (Americus)

172 224 - Arachis glabrata var. hagenbeckii. About the same as 172 223. (Americus)

261 872 - Arachis villosa. A bunch-type peanut, strong, medium sized, medium textured and prostrate. Produces abundant, medium, well distributed leaves. By mid-April it has 18 inch runners; spreads a total of five feet each year. It has been transplanted very successfully and produces fair quantity of seed. (Arcadia)

237 128 - Axonopus compressus. A rank growing grass of value as a forage that is quite responsive to nitrogen fertilizer. It is a very poor producer of seed. (Americus)

150 053 - Bracharia dictyoneura. In the first year in a field planting. It has shown remarkable ability to recover after grazing. It remained usable later in the season than either pangolagrass or bahiagrass. (Florida-Field)

292 183, 292 187, and 292 182 - Brachiaria brizantha. Strong and very strong South African plants. Produces abundant usable forage. Rapid and abundant regrowth after mowing or frost. Fair volunteering on bare ground or sod. (Arcadia)

Characteristics and Status of the More Promising Plant Introductions -2-

293 325 - Cenchrus ciliaris. This moderately strong perennial grass produces a moderate number of medium to fine stems and leaves. It is moderately rhizomatous with a 42-inch wide apical spread of leaves after one season's growth. (Arcadia)

213 885 - Chrysopogon fulvus. A fast growing bunchgrass reaching six feet tall. This is a heavy producer of seed and shows value in erosion control and for grazing. (Americus)

309 962 - Chloris gayana. This Brazilian introduction is a perennial bunch, stoloniferous, winter-hardy grass. It has moderate numbers of leaves and stems. It produces moderate tonnage of frost tolerant winter feed. It has good cold and drought tolerance and good seed production. (Arcadia)

282 691 - Desmodium sp. (giant beggarweed). A very strong, 12-foot tall perennial, shrubby legume with few strong, soft, gradually hardening stems. Produces an abundance of large pilose leaves. Seedlings compete very well in grass. Seed production is good in both spring and fall with excellent quality. (Arcadia)

106 663 - Digitaria eriantha. This produces large quantities of high quality forage when heavily fertilized. It must be spread vegetatively, however. It is winter hardy at Americus. Hybrids have been secured between it and our common crabgrass. (Americus)

Ex.196 293 - Echinochloa frumentacea (Chiwapa japanesemillet). This introduction was a contaminant in an accession of Setaria italica from India. It was certified and released by the Mississippi Crop Improvement Association in the spring of 1966. Its adaptation is wide, and its principal use primarily for wild duck use. There are approximately 40 field plantings in the South - most of them in Mississippi, comprising about 20 acres, all of them in areas susceptible to flooding. About eight acres of seed fields will be harvested in 1967. (Mississippi, Tennessee)

207 924 - Echinochloa holubii. A perennial grass with short rhizomes. It makes two seed crops annually and the seed is awnless. It is tolerant to water. Can be propagated by division and by seed. (Coffeeville)

310 004 - Eragrostis bahiensis. This moderately dense, bunch perennial grass from Brazil has abundant, fine, soft, sub-erect stems, which produce abundant, frost-tolerant leaves. Tonnage is fair for this introduction. Good color. (Arcadia)

208 994 and 232 813 - Eragrostis curvula. Two strains of weeping lovegrass that were determined to be of superior palatability in trials conducted by Dr. Kneebone in Oklahoma. These are being evaluated in the field plantings in comparison with common weeping lovegrass. Twenty acres of each are under study. (Knox City)

299 914 - Eragrostis curvula. A South African introduction that is strong, produces high yield, plus a fair quality of seed. Has abundant, fine, soft, sub-erect stems. Produces bunches of propagules at each node. The leaves are abundant, medium-textured, and seasonal. Growth type is seasonally both basal cauline and well distributed. Regrowth is early and abundant. (Arcadia)

295 698 - Eragrostis lehmanniana. An unusually productive lehmann lovegrass accession that will be evaluated in the trans-Pecos land resource area in comparison to the commercial strain. It has been hardy at Knox City for two winters. It has average seed production capabilities. (Knox City)

295 705 - Eragrostis superba. A highly productive plant that grows to a vegetative height of approximately three feet. Produces an abundance of seed heads. Seed shatter. It is indeterminant in heading and was harvested four times in the first year. It has been weakly hardy at Knox City the past two winters. (Knox City)

295 704 - Eragrostis superba. This is a South African grass which is moderately aggressive, with moderate numbers of medium-sized, soft, sub-erect stems. Leaves are moderate in number, medium-textured, seasonally basal cauline and well distributed. It commences growth very early in the spring and produces fair amounts of forage. (Arcadia)

203 728 - Festuca arundinacea. This accession has been outstanding in comparison with other like plantings. Besides excelling in growth it is a good seed producer and spreads by stolons and rhizomes. (Americus)

163 453 - Glycine ussuriensis. A dependable reseeder. It is a viney-type plant, matures seed in mid-September. Seed shatter excessively. (Coffeeville)

299 994 - Hemarthria altissima. A strong perennial with abundant good forage. Some cold tolerance. (Arcadia)

218 004 - Lespedeza virgata. The best low-growing lespedeza for highway plantings. This plant is already being increased by the Georgia Highway Department. Twelve hundred pounds of seed were harvested in 1966. It is a heavy seed producer. Seed mature fairly uniformly. Five acres for seed production were planted in South Carolina in 1967. (South Carolina, Americus, Coffeeville)

280 011 - Lotus corniculatus. A cool season legume that produces a good amount of succulent forage and of seed. This shows promise of being disease resistant at Americus. (Americus)

122 586 - Malus hupehensis. A good ornamental crabapple from China. The buds are red but the flowers are white; fruit, greenish-yellow, turning red. Seedlings come true to type. Has wildlife potential. (Coffeeville)

284 150 - Panicum antidotale. This moderately aggressive, bunch perennial produces moderate numbers of medium and fine, soft sub-erect stems. It has excellent regrowth after late fall mowing. It develops 36-inch tall leaves and heads up to 42 inches in four weeks after cutting in early November.(Arcadia)

196 292 - Panicum miliaceum (Dove proso). This accession was chosen over 35 others in its adaptation to the Southeast. It is an excellent grower and produces large quantities of seed relished by birds. Current plans are to get this under the State seed certification program in Georgia. It is already in commercial production. Seed production totaled over 5,000 pounds in 1966. Production came from North Carolina, South Carolina, Tennessee, Alabama, and Georgia. Field yields have been reported as high as 2,000 pounds per acre. (North Carolina, Georgia, Americus)

310 046, 310 047, 310 051 - Paspalum boscianum. These perennial, bunch-type, moderately aggressive grasses have stems moderate in number, medium sized, soft, and sub-erect. Main value is in their winter hardiness, remaining green most of the winter at Arcadia, Florida. Origin - Brazil. (Arcadia)

276 242, 310 059, 310 070 - Paspalum cromyorhizon. These grasses resemble bahiagrass. They are good seed producers and moderate forage producers. They are Brazilian introductions, perennial, bunch type, with moderate number of fine, soft, sub-erect stems. Numbers 310 059 and 310 070 are hardy at Arcadia, Florida; 276 242 has been hardy at Coffeeville, Mississippi.
(Arcadia, Coffeeville)

300 068 - Paspalum dilatatum. This accession had one plant which was very drought resistant. Selected for this reason only.
(Arcadia)

310 107, 310 108 - Paspalum hieronymii. These perennial, very stoloniferous, very strong grasses have abundant prostrate, medium-sized stems; abundant, soft, well distributed leaves. They spread two feet per month during growing season. Good, quick ground cover. Origin - Brazil. (Arcadia)

202 044 - Paspalum nicorae (Amcorae brunswickgrass). A warm-season, rhizomatos forage species from South America. A vigorous grower, making two harvestable seed crops per season. Seed yield good and seed quality good. Under test with four others and Pensacola bahiagrass at Americus. Field planting indicates good survival north to southeast North Carolina, north central Mississippi, and central Arkansas. Did not survive in northern Arkansas but did survive at Knox City, Texas. Approximately 60 acres under observation in field planting across the South.
(Coffeeville, Americus)

310 128, 310 135 - Paspalum nicorae. These rhizomatos, perennial grasses have abundant moderately soft, sub-erect stems. Leaves are soft and abundant. The plants are strong and are good seed producers. Seed viability is unknown. They grow with leaves six to eight inches tall and spread quickly by rhizomes. (Arcadia)

310 227, 310 234 - Paspalum plicatulum. These are perennial bunch grasses with moderate numbers of medium sized, medium textured sub-erect stems. The basal, cauline, medium textured leaves occur in moderate numbers. The plants are strong and produce fair tonnage of cold tolerant materials. They are of a softer texture than most of the native material and tend to spread vegetatively better. (Arcadia)

161 886 - Paspalum quadifarium. This is a bunchgrass with broad leaves. It is tall growing (five feet), has a fibrous root system, and is late maturing. It is winter-hardy at Coffeeville. (Coffeeville)

310 254 - Paspalum urvillei. This moderately strong introduction from Brazil is perennial, bunch type with moderate numbers of medium to coarse stems. Growth type is mostly erect and moderately dense. Thirty-eight inches tall. Foliage tolerance to frost is good at Arcadia. Good production of seed, volunteering readily. Regrowth after cutting is moderate in amount. (Arcadia)

310 270, 310 271, 310 272 - Paspalum yaguaronense. These moderately strong introductions have an erect to sub-erect growth of moderate numbers of stems, which produce an abundance of soft leaves in a basal cauline manner. After cutting the growth is rapid and abundant. Growth, volunteering, and ability to maintain green foliage in the winter at Arcadia are all good. (Arcadia)

310 287, 310 291 - Paspalum sp. These are perennials. They are bunchgrasses with moderately abundant, moderately textured, erect to sub-erect stems. Leaves are abundant, almost soft and of a basal cauline growth type. The plants are fair tonnage and seed producers with good winter frost tolerance. (Arcadia)

284 177 - Pennisetum pedicellatum. A strong annual grass with moderate numbers of fine seven-foot tall stems. Leaves are long and abundant with die-back on lower older leaves. It stands and grows vigorously even on flooded flatwood soils. Tonnage and seed production are good to very good. (Arcadia)

304 190, 304 192, 304 193 - Pennisetum purpureum. These new introductions from South Rhodesia are very strong perennial, bunch, weakly rhizomatos grasses. They have abundant, medium fine, moderately soft, well distributed leaves. Stems are abundant, coarse, and mostly erect. Recovery is moderately early and generally in abundance. Grows 10 to 13 feet tall. (Arcadia)

Characteristics and Status of the More Promising Plant Introductions -6-

271 603 - Pennisetum sp. A leafy, fine-stemmed, vigorous growing perennial plant. It is rhizomatos and recovers rapidly after clipping. Makes very few seed. One of a very few to tolerate winter conditions at Coffeeville, Mississippi. (Coffeeville)

21 970 - Pistachia chinensis. This small tree is one of the outstanding fall foliage plants grown in the South. This dioecious plant makes a berry that is eaten by small birds. (Americus)

165 718 - Setaria sphaceolata. This strong plant from Kenya is a bunch type perennial. It has moderate numbers of medium, soft, erect stems. Fair winter tolerance. Good very early spring growth. Decumbent stems root at nodes. (Arcadia)

311 517 - Stizolobium atterimum. A very strong, summer-growing bunch type annual legume with numerous long, strong vines. Very large alternate leaves occur in abundance. This accession blooms rather early (October 12) with a good quantity of firm seed produced by early November. The seed are large. (Arcadia)

218 114 - Themeda anathera. A perennial with short rhizomes. It is a very leafy green plant until heavy frost occurs. Seed mature late. Hardy at Coffeeville, Mississippi. (Coffeeville)

233 788 - Trifolium vesiculosum (Meechee arrowleaf clover). Certified in Mississippi in 1966. The crop is expanding rapidly. It is being used widely - South Carolina to Arkansas. There were approximately 50 acres planted for certified seed production in Mississippi last year with large acreages in Louisiana, Arkansas and South Carolina Mississippi has begun a test on beef production with the clover.

234 310 - Trifolium vesiculosum (Amclo arrowleaf clover). Certified in Georgia. Seed production has expanded tremendously. North West Farmers Marketing Service, Inc., Albany, Oregon, is offering seed in carload lots.

249 880 - Vicia lutea. A reseeding vetch that does not shatter its seed badly. (Coffeeville)

228 304, 228 305, 230 362 - Vicia sativa. These three produce excellent volunteering in undisturbed soil, disced soil, and in undisturbed sod in Florida. All volunteer in October. They are all annuals, bunch type, heavy seed, and forage producers. They produce abundant, fine, soft stems and leaves. PI-230 362 produces the most forage while 228 304 produces the most seed. Numbers 228 304 and 228 305 are strong, while 230 362 is rated very strong. Size ranges from 10 to 16 inches high, and from 24 to 48 inches wide. (Arcadia)

Characteristics and Status of the More Promising Plant Introductions -7-

229 970 - Vicia villosa. This unusual Iranian vetch is rated excellent in nearly every way. It starts blooming January 15 and continues in heavy production of racemes of trumpet-shaped flowers until it completely dies in late June. Forage production is a large mass of vines, leaves and flowers. Plants grow 24 inches high and 60 inches wide with some vines extending nine feet in length. Seed production seems to be low, possibly because only bumble bees can work the flowers. (Arcadia)

306 266 - Vigna vexillata. This moderately strong pea from Brazil is a vining, leguminous plant. It has abundant, medium soft, prostrate stems. Leaves are abundant, soft and well distributed. Its growth is frosted but regrowth continues each warm spell of the winter. Produces fair tonnage. Twelve inches high and 48 inches wide. (Arcadia)

TABLE I. -- Summary of Plant Introductions Under Observation by the Soil Conservation Service in the South, Fiscal Year 1967

Genera	Americus		Coffeeville		Knox City		Arcadia		Mayaguez *	
	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No Acc.
Acacia							1	2		
Aeschynomene							1	2		
Agropyron	3	5	1	1	3	3				
Andropogon	4	9	1	12			4	6		
Arachis	8	24	3	3	1	1	3	13	1	2
Aristida			1	1						
Arrhenatherum	1	1								
Arundinella	1	1					1	1		
Astrebla							1	1		
Axonopus	3	3					3	10		
Bothriochloa	1	3	3	3	2	7	1	2		
Bracharia	2	2	1	1			2	2	1	1
Brachypodium	3	4	1	1						
Bromus	2	3	4	13						
Cajanus	1	1								
Calopogonium							1	1		
Canavalia							1	1		
Cassia							2	2		
Castanea	1	1								
Casuarina							1	1		
Catalpa							1	1		
Cedreia							1	1		
Cenchrus	2	6	1	12			1	7		
Centrosema							1	1		
Chloris	2	2	4	7	1	2	6	12		
Chrysopogon	1	2	1	3	1	1				
Clitoria							1	1		
Coelorhachis	1	3								
Crotolaria							1	1		
Cunninghamia							1	1		
Cryptomeria	1	2								
Cymbopogon	1	1								
Cynodon	1	2	1	1						
Dactyloctenium							1	1		
Dactylis	1	1								
Desmodium							3	5		
Desmostachya	1	2								
Dichanthium	1	1			1	7	1	1		
Digitaria	12	35	1	1			6	8	10	147
Dolichos							3	3	1	2
Dorycnium	1	1								
Echinochloa	1	1	2	6			1	2		
Eleocharis			1	1						
Elymus					2	2				
Eragrostis	4	9	9	23	8	24	8	15		
Euchlanena	1	1								
Euonymus			1	1						

Table I (continued)

Genera	Americus		Coffeeville		KnoxCity		Arcadia		Mayaguez	
	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.
Festuca	4	9	3	4	3	3				
Glycine	2	3	2	2			2	2		
Hemarthria							1	2	1	1
Hordeum	1	1			1	1				
Indigofera	2	3					1	1		
Kochia							2	2		
Lathyrus	8	8	1	1						
Lespedeza	7	14	6	6						
Leucaena									1	4
Lithocarpus			2	2						
Lolium	1	3	1	4						
Lotononis	1	1								
Lotus	3	7	4	4						
Lupinus	16	45	2	2						
Malus	2	2	2	2						
Medicago	5	18								
Melilotus	3	3	4	4						
Metasequoia	1	1	1	1						
Olea							1	1		
Onobrychis	1	2								
Oryzopsis	1	1								
Osmanthus	2	4								
Panicum	6	31	1	1	2	43	15	80		
Paspalum	8	29	17	73	1	3	7	41		
Pennisetum	3	3	3	10			3	5		
Phalaris	3	48	1	3						
Phaseolus							3	3		
Phyllostachys	4	4	2	2						
Pistachia	4	12								
Poa					1	1				
Portulaceria	1	1								
Pyracantha			1	1						
Quercus	1	1	1	2						
Rhamnus	1	1	1	1						
Sacciolepsis							1	1		
Salix			5	5						
Sassa	1	1	1	1						
Schinus							1	1		
Setaria	2	2	13	51			6	9		
Sorghastrum							1	1		
Sorghum	4	4					1	2		
Sporobolus	1	1					3	3		
Stenotaphrum							1	1		
Stipa	5	5								
Stizolobium							1	1	3	7
Stylosanthes							1	5	1	2

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Table I (continued-2)

Genera	Americus		Coffeeville		KnoxCity		Arcadia		Mayaguez	
	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.	No. Sps.	No. Acc.
Themeda	1	1	3	10						
Trachypogon							1	1		
Tricholaena	1	1					1	1		
Trifolium	8	24	17	28			2	2		
Tristania							1	1		
Vicia	18	57	8	21			2	20		
Vigna							3	3		
Zoyzia			2	3						

* Initial observations in Puerto Rico are carried out in cooperation with the College of Agriculture at Mayaguez.

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TABLE II. -- Plant Introductions being Initially Increased by the Soil Conservation Service in the South - Fiscal Year 1967

P. I. Number	Species	Where Increased
261 099	Agropyron obtusinaculus	Coffeeville
261 851	Arachis burkartii	Americus
116 976	Arachis glabrata	Americus
162 801	Arachis glabrata	Americus
172 223	Arachis glabrata	Americus
262 794	Arachis glabrata	Americus
262 801	Arachis glabrata	Americus
172 224	Arachis glabrata var. hagenbeckii	Americus
151 982	Arachis glabrata var. hagenbeckii	Americus
262 811	Arachis sp.	Americus
262 817	Arachis sp.	Americus
262 819	Arachis sp.	Americus
262 826	Arachis sp.	Americus
262 828	Arachis sp.	Americus
262 839	Arachis sp.	Americus
263 393	Arachis sp.	Americus
237 128	Axonopus compressus	Americus
195 476	Bromus catharticus	Americus
243 199	Cenchrus ciliare	Arcadia
271 198	Cenchrus ciliare	Arcadia
215 586	Chrysopogon fulvus	Coffeeville
279 748	Cryptomeria japonica	Americus
224 152	Cynodon dactylon	Americus
299 648	Digitaria macroglossa	Arcadia
295 689	Eragrostis curvula	Knox City
295 703	Eragrostis curvula	Knox City
295 698	Eragrostis lehmanniana	Knox City
295 699	Eragrostis lehmanniana	Knox City
209 385	Eragrostis robusta	Coffeeville
234 218	Eragrostis robusta	Arcadia
295 705	Eragrostis superba	Knox City
299 993	Hermarthria altissima	Arcadia
197 075	Indigofera pseudetinctoria	Americus
186 171	Lespedeza cuneata	Americus
246 770	Lespedeza intermixta	Coffeeville
218 004	Lespedeza virgata	Coffeeville
184 776	Panicum coloratum	Americus
263 603	Panicum coloratum	Arcadia
210 692	Panicum coloratum var. makarikariende	Americus
156 080	Panicum maximum	Arcadia
178 257	Panicum stapflanum	Americus
202 044	Paspalum nicorae	Knox City
202 480	Phalaris tuberosa var. stenoptera	Americus
52 674	Sasa pygmaea	Americus
218 114	Themeda anathera	Coffeeville

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TABLE III. -- Supplemental Seed Increases of Plant Introductions on Plant Materials Centers in the South, Fiscal Year 1967

P.I. Number	Species	Place	Acres	Amount
118 457	Arachis glabrata	Arcadia	1-1/2	920 bu.rhizomes
263 393	Arachis monticola	Coffeeville	1/4	265# seed
		Americus	3/4	47# seed
262 839	Arachis sp.	Arcadia	1/2	not harvested
153 053	Bracharia dictyoneura	Arcadia	1/2	1 ton green material
58 602	Castanea mollissima	Americus	6 trees	80# nuts
210 693	Cenchrus ciliare	Arcadia	3	seed failure
213 885	Chrysopogon fulvus	Americus	1/100	20#
215 586	Chrysopogon fulvus	Coffeeville	1/26	11#
106 663	Digitaria eriantha	Coffeeville	1/4	30,000 tillers
		Americus	1/20	--
Ex.196 293	Echinochloa frumentacea	Americus	1	263# seed
207 924	Echinochloa holubii	Coffeeville	1/10	20#
106 274	Eleocharis dulcis	Coffeeville	360 sq.ft.	252#
208 994	Eragrostis curvula	Knox City	1	108#
232 813	Eragrostis curvula	Knox City	1	106#
203 728	Festuca arundinacea	Americus	2	50#
163 453	Glycine ussuriensis	Coffeeville	4	500#
246 770	Lespedeza intermixta	Coffeeville	1/10	5# seed
218 004	Lespedeza virgata	Americus	1	110# seed
122 586	Malus hupehensis	Coffeeville (nursery bed)	1375 sq.ft.	5,800 plants
259 563	Panicum maximum	Arcadia	1	not harvested
196 292	Panicum miliaceum	Americus	2	323# seed
202 044	Paspalum nicorae	Coffeeville	1	300# seed
		Americus	1/2	54# seed
55 975	Phyllostachys aurea	Americus	1/100 a.	--
40 842	Phyllostachys bambusoides	Americus	1/20	--
143 540	Phyllostachys bissettii	Coffeeville	20 ft.row	--
		Americus	1/2	--
21 970	Pistacia chinense	Americus	8 plants	20# seed
		Coffeeville (nursery bed)	200 sq.ft.	1,250 plants
234 310	Trifolium vesiculosum (Meechee arrowleaf - not grown as certified seed)	Americus	1	113# seed

TABLE IV. -- Production of Registered and Other Foundation Seed from Plant Introductions on Plant Materials Centers, South, Fiscal Year 1967

P.I. Number	Species	Place	Acres	Amount
Ex. 196 293	Echinochloa frumentacea (registered Chiwapa japanesemillet)	Coffeeville	3	963#
233 782	Trifolium vesiculosum (registered Meechee arrowleaf clover)	Coffeeville	3	580# seed
234 310	Trifolium vesiculosum (registered Amclo arrowleaf clover)	Americus	5	731# seed

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TABLE V. -- Estimated Acreage of Commercial Seed Increase Fields, Fiscal Year 1967

P.I. Number	Species	Common Name	Amount (Acres)
109 452	Agropyron elongatum	Largo tall wheatgrass (Texas)	15
150 123	Agropyron elongatum	Jose tall wheatgrass (Texas)	10
106 831	Agropyron trichophorum	Luna pubescent wheatgrass (Texas)	15
78 758	Andropogon caucasicus	Caucasian bluestem (Texas)	20
118 457	Arachis glabrata	Arb peanut (Florida)	3
262 839	Arachis glabrata	Arblick peanut (Florida)	1
153 053	Bracharia dictyoneura	signalgrass (Florida)	1
Ex.196 293	Echinochloa frumentacea	Chiwapa japanesemillet (Mississippi)	8
218 004	Lespedeza virgata	spreading lespedeza (Georgia-So.Carolina)	20
196 292	Panicum miliaceum	Dove proso (Alabama, Georgia, So.Carolina)	50
202 044	Paspalum nicorae	Amcorae brunswickgrass (Arkansas)	10
233 782	Trifolium vesiculosum	Meechee arrowleaf clover (Mississippi, Louisiana, Arkansas)	50

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Report for 1967 Meetings of Regional Technical Committees on New Crops

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Northern Utilization Research and Development Division

SCREENING

Samples: In the year ending May 31, 1967, 572 seed samples were received for screening plus 278 (including 224 of vernonia) special samples. These latter included 90 pounds of *Limnanthes douglasii* from Alaska and 250 pounds (of 1,100 pounds produced) of *Satureja hortensis* from Wawawai, Washington. Smaller special samples of various types were received from Georgia, Nebraska, Iowa, Oregon, Mississippi, and Oklahoma.

Of the 8,605 seed samples received through the NCRB for screening tests before December 1, 1966, those from PL-480 grants, 4,780, are shown in the table.

Seed samples received December 1, 1961-November 30, 1966

Year	Non-PL-480 Sources	Turkey	Israel	Spain	Pakistan	Uruguay	Yugoslavia	Korea	India
1961	462	298	1						
1962	234	220	163	114	79	85			
1963	90	230	43	146	148	107	246		
1964	98	363	25	193	144	116	466	41	
1965	169	213	31	130	118	32	272	39	1
1966	151	175		91	102	134	110	37	67
	1,174	1,499	263	674	591	474	1,094	117	68

Of the 3,825 samples received from non-PL-480 sources since the beginning of the screening program, some came from the regional stations, from commercial seed houses, and from special collections in Mexico and Africa. Relatively few have come from collections in the United States.

Results: Seed lipids of *Cardamine impatiens* (Cruciferae) and of various *Chamaepeuce* sp. (Compositae) contain, respectively, dihydroxy and trihydroxy fatty acids, and consist predominantly of unique tetra-acid and penta-acid triglycerides, respectively. *Impatiens edgeworthii* and various Celastraceae seed lipids contain major percentages of α-acetotriglycerides. Thorough testing of these and related species in the field is desirable to permit appraising the extent of utilization research warranted to establish end uses and markets.

Two families, the mints (Labiatae) and borages (Boraginaceae) have been systematically studied for seed lipid composition. Among 194 mints were found numerous high oil content seeds having a wide variety of composition. Lamium sp. contains a new allenic acid somewhat related in structure to the acid in Leonotis, but having an isolated trans bond. One genus apparently contains a new hydroxy acid. Many are high-iodine value oils of the linseed type. Among 33 borages recently examined (total 62) are some that may provide raw material for synthesizing a hormone now under active study--prostaglandin; some are highly unsaturated and could be used as linseed-type oils. Interesting taxonomic relations are resulting from joint consideration of these results with CR botanists.

Screening of Umbelliferae for oil composition is in progress and about 75 species have been examined thus far. Fennel, which has been under study for some time, produces oil containing about 72 percent petroselinic acid. About a dozen species are now known to produce higher concentrations of petroselinic acid. Among the highest are Apium ammi, 85 percent; Anethum graveolens, 80 percent; Lagoecia cuminoides, 79 percent; Petroselinum crispum, 78 percent; Synelcosciadium carmeli, 78 percent; Tordylium aegypticum, 77 percent; and Daucus aureus, 76 percent.

Other unusual components have been detected in oil from Ephedra campylopoda (22% of a C_{20} tetraene), Primula veris (probably a C_{18} tetraene in a new family), Gladiolus illyricus (not triglyceride), and Crocus and other Gladiolus (much like G. illyricus). Caltha palustris oil contains 23 percent of a C_{20} trienoic acid.

Amino acid compositional analysis has now been completed on 379 species of plant seeds selected primarily because of high protein content but, in some instances, because of agronomic potential or because chemical composition of the plant family was not otherwise known. Most of the meals were adequate for the essential amino acids required for food except for methionine and isoleucine and for lysine in the cereal grains. Tryptophan was not included in the study. This work constitutes by far the most extensive set of amino acid data obtained by one method. Some statistical correlations and chemotaxonomic relations have been established.

Interesting papainlike proteolytic enzyme activity has been found in fruit of Jarilla chocola, a plant obtained by NCRB on a Mexican exploration.

DEVELOPMENTAL RESEARCH

High Erucic Oilseeds: Crambe seed from 40 acres in Indiana has been processed in a small commercial plant. Approximately 250-300 acres are planted in Indiana in 1967. A company in Illinois planted 20 acres this year with the expectation of using the increase to plant in 1968 for export to Japan. A small planting was made in southeast Missouri; seed for these plantings were supplied from NU at the direction of CR. The size of the commercial planting by Pacific Vegetable Oil Corporation is increased this year but

we do not know the actual area. We are told "It is anticipated that all the needs of the steel industry for crambe oil as lubricant will be taken care of." Canadian interest in crambe continues.

In a beef cattle finishing trial at the University of Nebraska, cattle receiving a supplement in which half of the protein was from processed crambe meal gained as much as the control group receiving only the usual supplement. Chemical studies at NU have identified several heretofore unsuspected compounds derived from the thioglucosides of crambe (and rapeseed) meals. It is hoped that further work will lead to processes for the removal or neutralization of these undesirable compounds.

Publicity on the properties of nylon 1313 and the availability of samples prepared under contract with NU at the Southern Research Institute has resulted in many requests for samples and revealed widespread interest. The contractor reported he has "not found any problems in processing nylon 1313 or any deficiencies in properties, compared to nylon 11 and nylon 610, that would restrict its usage" and that "the lower water absorption of nylon 1313 may be a significant advantage."

A number of samples other than crambe with erucic acid above 50 percent have been encountered. Some have come from a PL-480 grant in Sweden and some from the NU general screening work. An increased number of these have now entered the cooperative plant evaluation and seed increase program on the possibility that we might find a line that produced oil equivalent to crambe and be superior in productivity, adaptability, or nutritional quality. Species represented include Brassica napus, B. campestris, B. hirta, B. chinensis, and Erucastrum strigosum.

Tephrosia vogelii: Chemical research is continuing on this plant which contains rotenoids in the above-ground portions. Specific rapid methods have been developed for the determination of the principal components, rotenone and deguelin, in Tephrosia. In analysis of leaflets the total rotenone plus deguelin ranged from less than 1 percent to almost 4 percent, but there was usually more of the reportedly less active deguelin than rotenone. There were significant variations among lines in the ratio of rotenone to deguelin. The availability of these newly developed methods should be most helpful in future selection studies to obtain improved lines for commercialization.

Satureja hortensis: The Satureja hortensis (a mint) seed from Wawawai contained 45.1 percent oil and 21.4 percent crude protein (dry basis). Protein content of the oil-free meal is 39 percent (dry basis). Oil from this sample had an iodine value of 213.7 and contained 70 percent linolenic acid. About 70 pounds of oil has been prepared for distribution to industrial companies to explore their interest in this type of oil, similar to linseed oil. A presentation describing the potential of this species was given at NU in June before the National Flaxseed Processors Association's Technical Committee.

Kenaf: The need for sound economic data and effective techniques for harvesting, handling, and preserving kenaf quality in storage between the field and the pulp mill continues to hold the spotlight. The interest in kenaf as a pulping raw material is expanding among those already investigating its potential. Experimental plantings by the pulping industry totaled about 200 acres in 1966, and a similar quantity is expected in 1967. A substantial portion of this is devoted to varietal studies and the remainder to studies on handling and preservation. The varietal studies will be conducted in both Florida and Texas.

Further evidence of the interest in kenaf is provided by the second annual meeting of the TAPPI ad hoc Committee on Kenaf and Related Materials held in New York City last February. In addition to its discussion of agronomic and economic factors and the technology of kenaf for pulp, the Committee recommended a fall meeting in the South for seminars and demonstrations. This will be sponsored jointly by TAPPI and the University of Florida Agricultural and Engineering Experiment Stations at Gainesville, Florida, October 31 and November 1. Mr. S. C. Uhr, manager of forest lands for Hudson is current chairman of the ad hoc Committee and T. F. Clark of NU, the secretary.

NU and CR have kenaf plantings sponsored in Illinois, Indiana, and Louisiana this year. Emphasis in use of the material will be on methods for compaction to achieve higher density of raw material for ease in handling; on processing methods, including those currently used for sugarcane bagasse; and on storage procedures, including bale storage and ensilage.

REPORT OF
NEW CROPS RESEARCH BRANCH, ARS, USDA
TO
REGIONAL TECHNICAL COMMITTEES
NE-9, S-9, NC-7, W-6

This report is designed to bring to the technical committees a summary of research of the New Crops Research Branch for the reporting period April 1, 1966, through March 31, 1967. It is based on the annual "Multiple Use Report" which is used to inform Advisory Committees and others of the Branch activities. Although a portion of this report reflects other than regional programs, our research is so overlapping that all of the activities reported here are of interest to the technical committees.

USDA AND COOPERATIVE PROGRAM

The nature of this program is to conduct investigations concerned with the introduction, evaluation, and maintenance of plant germ plasm in support of a strong and diversified agriculture for the United States. Both basic and applied research is undertaken in the areas of: economic botanical assessment of the world's plant resources and exploration for diverse germ plasm in the world centers of crop origins; agronomic, horticultural, and pathological evaluation of introductions as breeding stocks through a national cooperative program for sources of natural resistance to crop pests, as potential new crops and for other uses brought about by shifts in agriculture and industrial and medical technologies; and the preservation of important segments of germ plasm either as seed or as vegetative stocks. Leadership for this program is at Beltsville, Maryland.

Four national introduction stations are responsible for evaluation, maintenance, and/or quarantine of new introductions which require special handling: Chico, Calif., Miami, Fla., Savannah, Ga., and Glenn Dale, Md. The responsibility for preservation of seed stocks of national interest lies with the National Seed Storage Laboratory, Fort Collins, Colo. Cooperative new crops studies to determine significant agronomic characteristics of plants having valuable end-products are conducted cooperatively with Experiment Stations of Montana, Nebraska, North Carolina, and Oregon. Four regional and one inter-regional introduction stations deal with the evaluation of crop breeding stocks essential to programs in State Experiment Stations.

A contract has been established at Lafayette, Ind., to investigate the crop developmental problems of Vernonia anthelmintica, a natural source of epoxy acid in the seed oil.

Fourteen PL 480 projects are active, all dealing with research on the collection and evaluation of native plants of potential use in the agriculture of the United States. The countries and number of projects are as follows: India - 8, Israel - 1, Korea - 1, Pakistan - 2, Turkey - 1, Yugoslavia - 1.

The Federal scientific effort devoted to research in New Crops totals 38.0 man-years. Of this number, 3.0 are devoted to international plant exchange, 3.3 to botanical investigations, 6.6 to special plant procurement and related botanical activities. Research on new crop evaluation includes 8.5 man-years for horticultural research, 4.3 for agronomic studies, 4.8 devoted to evaluation of potential new crops, 4.5 to pathology, and 3.0 to maintenance of germ plasm.

PROGRESS -- USDA AND COOPERATIVE PROGRAMS

A. Plant Introduction

1. Breeding Stock Introduction. International plant exchange in 1966 resulted in 7,581 acquisitions and 1,752 shipments were made to 116 countries. Forage plants (2,308), vegetables (2,193), and cereal grains and sorghum (1,116) constituted the major introductions.

a. International exchange. Collections of special significance included 334 items from the Soviet Union and associated "bloc" countries. PL 480 projects supplied 167 grasses and legumes (Spain) and 309 oats (Avena) (Israel). Cooperation with the University of Reading, England, provided a valuable collection of 711 small grains and 116 forages from Afghanistan.

b. Foreign exploration. Two major field explorations were accomplished: (1) Mexico for beans (Phaseolus), 305 collections; and (2) Korea for ornamentals, 537 collections. The final inventory was completed for the 1965 Jones-Keller expedition to the Soviet Union. This expedition added 1,075 forage plant accessions to U.S. breeders' gene pool. Through cooperation with Oklahoma State University, 150 dryland forage species were collected in Mexico and Texas and will be placed on inventory after increase.

c. Domestic exploration. Collection of woody ornamentals from the Great Plains States was completed, the project to collect native and naturalized forage species in Alaska was initiated, as well as one for native blueberry (Vaccinium) species in the Appalachians. The latter produced 23 items with larger numbers anticipated in 1967-68.

d. Support for AID missions. Requests for experimental plant materials to support these programs were less than for 1964-65 but technical assistance through providing advice and recommendations increased. Personal conferences between Beltsville and AID field personnel were more frequent than in previous years and this should lead to even more efficient programming in the future. Requests for plant materials came from 32 countries and resulted in 54 shipments composed of 1,000 items. The greatest activity occurred in the Latin American Region and may be a partial reflection of direct field contacts made during early 1966.

The cacao, coffee, and rubber collections, being maintained at the Miami Plant Introduction Station, are continuously being used to fill requests from AID and other research programs in the tropics. Cacao breeding stocks are in greatest demand. Through periodic surveys by qualified virologists, there is now a total of 185 virus-indexed cacao clones available for distribution. An inventory of clones being held at Miami and Mayaguez will be issued early in 1967.

e. Maintenance of germ plasm. Total accessions in the National Seed Storage Laboratory now number 53,000, an increase of 10,000 over 1965. Major emphasis is being directed toward acquiring valuable genetic stocks such as the Blakeslee Datura and the Cleland Oenothera collections. These and other collections have been thoroughly studied cytogenetically and represent documented materials for future research.

Storage temperatures and humidities in use appear to be quite satisfactory. Only 50 lots of the hundreds entering storage in 1961 will require revitilization in 1967. Research for the effect of flexible moisture barriers on seed longevity over a range of temperature and humidity values has been underway for four years. Of the 24 materials tested, 13 have allowed only minor losses of viability over an 18-month period. One product, a fluorohalocarbon material, permitted retention of full viability of seed of originally 5 percent moisture content for a period of 48 months at 90°F. and at 90 and 70 percent relative humidities.

Project work was completed in 1966 in determining whether seed longevity of varieties within the same species varies significantly. Statistical treatment of the data indicates that it does.

Supplements No. 2 to the first inventories prepared in 1962 were prepared in 1966 covering corn, cotton,and fiber, oilseed, small grains, sorghums, and vegetables now in the NSSL.

Progress was made in publishing the backlog of the regular series of Plant Inventories. Nos. 164, 165, 166, and 167 were printed and Nos. 168 and 169 should appear in 1967.

f. Research on centers of crop origins. Based on phytogeographic studies of Cucumis and its insect and disease pests, we now have better information on probable primary and secondary centers of origin of this genus of economic plants. Future explorations for germ plasm of this genus will greatly benefit by this additional background knowledge.

Similar studies have been applied to beans (Phaseolus) and will be undertaken on peanuts (Arachis) and soybeans (Glycine).

2. Plant Resources

a. Plant taxonomy and nomenclature. The taxonomic study of the important grass genus Lolium was completed. This resulted in a comprehensive taxonomic revision of the genus which will be published as a USDA Technical Bulletin.

Field study and collection of Vernonia, section Stengelia, source of seed oil high in epoxy oleic acid was completed during the year. This field work yielded an extensive collection of seed of Vernonia species which will provide a basis for further chemical and agronomic evaluations of the genus as a new oilseed crop. Field data along with information previously accumulated from herbarium studies will form the basis of a thorough taxonomic monograph of this group of plants.

During the year a total of 211 USDA scientific manuscripts were checked for accuracy in use of scientific names of plants; 709 plant specimens and 2,090 seed samples were identified.

b. Botanical investigations of new crops. The seed oils of Crepis, a large genus of the tribe Cichorieae, are rich in crepenynic acid and vernolic acid. During this reporting period, seed samples of several additional species were obtained from PL 480 countries. A Turkish sample of C. alpina contains 74% crepenynic acid, the highest percentage discovered to date. The sections of the genus containing both high vernolic and high crepenynic species are Old World in distribution with the highest concentrations of species in the Mediterranean region.

Substantial concentrations of crepenynic acid have also been encountered in two genera of the tribe Cichorieae closely related to Crepis: Lapsana communis (50%) and four species of Picris (30-46%). The occurrence of high concentrations of crepenynic acid in these genera as well as Crepis, greatly increases the possibility of discovering high percentages of crepenynic acid in plants having good crop potential.

A paper evaluating the seed of 379 species as potential sources of protein for food or feed was prepared for publication. Seed proteins from a number of the species have a better pattern of essential amino acids than many crop seeds. This research gathers impetus from the present world shortage of protein and the greater shortage that is predicted.

Seed of 194 species representing 56 genera of the Labiatae were analyzed for oil and protein content and for fatty acid composition. A botanico-chemical paper reporting on this research was submitted for publication. The seed oils of the Labiatae include many containing high concentrations of oleic, linoleic, and linolenic acids. A number of the oils contain unidentified or recently characterized fatty acids including laballenic and other allenes, hydroxy acids and several others that appear to be C_{18} trienes and probably some unusual ones with less saturation. Such unusual oils and fatty acids have potential value in industry. Our present information indicates that a search for additional species rich in laballenic acid would most profitably be made among the members of subfamily Stachyoideae and particularly among the species comprising the tribe Stachydeae. Oils from all 13 species of the genus Teucrium contain trans unsaturation in unidentified components. Two species of Lamium contain allene in addition to trans unsaturation and two species of Thymus appear to produce hydroxy acids. Knowledge of the correlation between such chemical constituents and related plant groups can provide considerable guidance for future screening efforts. PL 480 projects continued to supply practically all of the samples entering the seed screening program during the reporting year. India supplied 62 samples; Korea 32; Pakistan 170; Spain 41; Sweden 11; Turkey 190; and Uruguay 73, for a total of 579 samples. As valuable as these collections are, general screening alone is not enough. Intensive follow-up botanical studies are needed to evaluate the crop potential in selected plant groups and only staff botanists can do this job effectively.

The seed oil and protein screening program continues to produce a wealth of promising leads to new and unusual constituents. During the reporting year 29 species were selected for further agronomic and chemical study.

c. Anticancer screening. A total of 1,608 plant samples were supplied to laboratories designated by the Cancer Chemotherapy National Service Center for preparation of extracts for anticancer screening. This number includes 1,512 samples for preliminary screening, 21 recollections of preliminary actives for completion of screening, and 75 recollections of confirmed actives.

Several laboratory prepared derivatives of camptothecin, isolated from Camptotheca acuminata, are now known to show equivalent or better anti-leukemic activity than the parent compound. The supply of Camptotheca for isolation of additional camptothecin is adequate for immediate needs. An additional 5,000 seedlings were established to assure an adequate supply two to three years hence. An active chemical constituent with possibly better anticancer activity than the active constituent of Camptotheca acuminata was isolated from another plant. Very promising antileukemic activity was detected in a crude extract of an accession from Turkey.

d. Vegetation studies of tropical regions. In continuation of Publication CR-49-65, entitled "Vegetation of Southeast Asia: Studies of Forest Types 1963-65", issued in December 1965, considerable time has been devoted during the past year to the preparation of a comprehensive report on the forests of Southeast Asia and their correlation with Puerto Rico and Texas. This supplemental report contains a detailed discussion of various types of forests, savannas, bamboo and palm brakes, climate and soil patterns of the five countries of the Mekong basin countries, and their affinities or contrasting features in Puerto Rico and Texas. Information is given on plants that develop as secondary or successional growth following cutting and clearing or after treatment with chemicals. Other information included is a treatment of useful and toxic or otherwise injurious plants, especially the most common ones found in the Mekong basin countries, and the parts of plants that may be eaten and method of preparing them for use in times of emergancy.

The report will include a series of maps and illustrations, to complement those published in the first report. Judging by the constant demand for the first report issued in December 1965 on the "Vegetation of Southeast Asia", the report now in press should be of considerable value to the military, especially in field operations.

B. New Crop Evaluation

Evaluation of Breeding Stocks. Research emphasis is directed toward evaluation of plant introductions as sources of genetic variability to improve crop quality, varietal resistance to pests and diseases, and to develop new industrial, agronomic, and horticultural crops through Federal and regional cooperative programs.

1. Horticultural Crops

a. Fruits and nuts. Growers' interest in the Chinese Gooseberry (Actinidia chinensis) continues to increase as this new fruit becomes

better known. One grower at Corning, Calif., propagated seedlings during the year to plant 40 acres. This brings the total reported to 67 acres. Eight hundred pounds of fruit were harvested from 12 vines belonging to a cooperator at Paradise, Calif., and were sold readily for an undisclosed price to a restaurant chain.

The insects responsible for pollinating Chinese Gooseberry flowers are being studied. Thus far six species have been collected and identified from the male flowers; nine from the female. The field trial of Chinese Gooseberry varieties introduced from New Zealand yielded 1,300 pounds of fruit, the first full crop.

Trees of 10 almond varieties introduced as seed from Italy in 1959 have flowered at Chico for two years. Among these seedlings are individuals with first flowers opening as late as April 13. Commercial almonds start to bloom in late January or early February, depending upon weather conditions, and the flowers often are killed by frost.

A precocious flowering characteristic has been identified at Chico in seedlings of English walnut introductions. Some seedlings fruited in their second growing season. The genetics of the character are being studied.

At Glenn Dale, the major emphasis in research with fruit introductions continues on virus studies. Efforts to detect virus infection in apple, pear, and grape introductions using seedlings of Chenopodium quinoa as herbaceous indicators led to the discovery of a seed-borne virus (CQV) in this valuable indicator plant. An antiserum for detecting it in quinoa was prepared at Glenn Dale. All quinoa seed now used in the program is from virus-negative parents.

Evaluation of tropical and subtropical fruit introductions at the Miami station again was set back by a hurricane. The 1966 storm caused less breakage of tree branches but more extensive salt burn than storms experienced in 1964 and 1965. In spite of this interference the mango evaluation program has shown seedling progenies of certain parents to be much more precocious than others. Five seedlings were selected for further testing of fruiting characteristics.

In cooperation with members of the NC-7 Technical Subcommittee on Fruit Crops, the Minnesota Agricultural Experiment Station published descriptions of plant introductions and hybrids of plant introductions as Technical Bulletin 252, Prunus hybrids, selections and cultivars, at the University of Minnesota Fruit Breeding Farm.

b. Vegetables. The collection of vegetable germ plasm was again expanded during the year. Numerous collections of Phaseolus vulgaris, including both wild and cultivated types, were added to the collection. The wild material appears particularly promising as a source of genes for disease and insect resistance, particularly to Fusarium root rot.

In the Regional Plant Introduction Progran the four cooperative stations grew Vegetable Plant Introductions as follows for evaluation and seed increase:

NC-7, Ames, Iowa	820	accessions
NE-9, Geneva, New York	1500	"
S-9, Experiment, Georgia	1080	"
W-6, Pullman, Washington	844	"

Included are both recent introduction being grown for the first time and older introductions being increased to maintain seed viability.

At the Nebraska Agricultural Experiment Station six tomato introductions out of 394 tested showed resistance to 2,4-D spray injury. One of these, P.I. 129131 from Panama, appears promising for use in breeding programs.

Out of 99 carrot introductions screened for resistance to root-knot nematode at the Regional Station, Ames, only one (P.I. 174206) was as resistant as Early Chantenay.

With the cooperation of the other three Regions, the Northeast Regional Plant Introduction Station, Geneva, published a list of pea introductions (Pisum sativum) having resistance to the diseases, insects, and nematodes attacking this crop.

The Delaware Agricultural Experiment Station released a new cantaloupe variety with resistance to downy and powdery mildew, and to Alternaria leaf spot. Resistance was attributed to P.I. 123517.

Plant breeders in South Carolina report the release of 'Gemini' and 'Cherokee' cucumbers. Both new varieties derived multiple disease resistance from P.I. 197087 and P.I. 220860.

The Western Regional Plant Introduction Station started to evaluate and increase the more than 2,000 bean introductions received as a result of the exploration program in Central America and Mexico. Predominant among the introductions grown in 1966 were dry bean types with vine or semi-vine habit.

The University of Arkansas released the 'Pope' tomato for green pickling. It was derived from a cross of P.I. 79532 X 'Roma'. It inherited high resistance to Fusarium wilt from both parents since 'Roma' also has the same plant introduction as one parent. The 'Harvester' tomato, released by the USDA also carries Fusarium wilt resistance from the same source.

The Missouri Agricultural Experiment Station published as Research Bulletin 908 the detailed analyses of 250 plant introduction tomatoes for acidity and soluble solids.

'Dixie Savoy' spinach released jointly by the USDA and the Texas Agricultural Experiment Station contains genes for resistance to blight from P.I. 20026, and to two races of downy mildew from P.I. 140464 and P.I. 140467.

The IR-1 Potato Introduction Project reported the release of 'Chieftain' for commercial production. One hundred of the 106 potato varieties developed and released in the United States during the past 30 years have two or more foreign introductions in their pedigrees. Segments of the Solanum species collection were screened in Iowa and Minnesota for insect resistance.

The Minnesota Agricultural Experiment Station published, as Technical Bulletin No. 253, the results of an extensive survey for aphid resistance in 395 introductions of tuber-bearing Solanum species. New sources of resistant genes are indicated by these tests.

c. Ornamentals. At Glenn Dale an outstanding seedling from the cross P.I. 228187 Camellia rusticana 'Yoshida' X P.I. 226756 C. lutchuensis has been named 'Fragrant Pink' and released for propagation. The most outstanding characteristic of 'Fragrant Pink' is its pleasant fragrance, identical to that of the male parent. The flowers are deep purplish pink, semi-double, and about 2 1/4 inches in diameter.

From a population of 354 seedlings of the cross Ilex cornuta X I. ciliospinosa, three individuals (2 females and 1 male) were selected for propagation and further testing. The reciprocal cross has not produced any outstanding individuals.

At the Miami station, the 'Rosemound', Dombeya has performed outstandingly as a flowering shrub for landscape use and growing in containers. The clone has been propagated and distributed for wider testing.

Preparations are being made at Savannah to expand investigations with ornamental plant introductions for the lower Atlantic and Gulf Coast areas.

Also at Savannah propagation tests with rhizomes of Phyllostachys viridis, dug at monthly intervals, revealed that late February is the best time to transplant this temperate bamboo.

As a result of the exploration trip to Korea by E. G. Corbett and R. W. Lightly during 1966, many new ornamental plant introductions were received. As soon as the introductions can be propagated they will be offered to cooperators for testing in the various climatic zones of the country.

2. Agronomic Crops. Agronomic research largely reflects the activities of the four regional cooperative programs NE-9, NC-7, S-9, W-6. These cooperative Federal-State efforts on preliminary evaluation of forage and other agronomic crops bring to light a diversity of genetic factors for crop adaptation, insect and disease resistance, and production.

a. Forage crops and legumes. Certain warm-season grass introductions are reported as being outstanding for specific utilization. Digitaria species are reported by three Gulf Coast States and SCS to exhibit shade and cold tolerance and high seed and forage production. Maximum

cold tolerance is exhibited by fertile species, which enhances their value per se, in addition to their employment in plant improvement programs. Outatanding among these is D. setivalva (P.I. 299795), which possesses the following desirable agronomic characteristics: agressiveness, competitiveness, early spring recovery, high yield capability, and widespread adaptation. Pangolagrass is being used successfully in Puerto Rico in crop rotations for control of pineapple nematode. Three accessions (P.I's. 299993-5) of Hemarthria altissima (a sterile perennial requiring vegetative propagation) are free of disease and insect problems in Florida (these three accessions are also reported from Hawaii). This species appears to be widely adapted as a ground cover and erosion control plant; preliminary reports from Florida indicate it is palatable to cattle.

The majority of reports on use of plant introductions continue to emphasize contributions of individual introductions made in the development of new varieties. Among these contributions are the following: 'Jose' tall wheatgrass, Agropyron elongatum (P.I. 150123) released jointly by SCS and New Mexico AES has good agronomic characters including seedling vigor, excellent leaf density, and high palatability; 'Meechee' arrowleaf clover was developed from P.I. 233782 from Italy. This clover seeds well, is not shattering, and combines readily. It produces abundant forage during the critical feed-shortage period from late March to early July in southeastern U.S.; 'Pomar' orchardgrass, Dactylis glomerata (P.I. 111537) released by SCS and Idaho AES, is a good seed producer and recommended as a cover crop; and alfalfa breeding line N.C.W. (64)1 developed from Medicago sativa var. gaetula (P.I. 239953) was released by ARS and North Carolina AES. One of its chief merits is resistance to oviposition of the alfalfa weevil.

Twenty-two Medicago accessions exhibit possible resistance to the alfalfa weevil after preliminary screening trials were concluded in North Carolina. These findings were verified in Tennessee for three accessions of M. falcata (P.I's. 228152, 231731, and 262532). Possible weevil resistance is exhibited by six additional accessions of M. falcata evaluated in Tennessee. Trifolium carolinianum (P.I's. 291776-7) is being utilized as a host plant in the maintenance of pure races of Erysiphe polygoni. Two accessions of Vicia sativa (P.I's. 212055, 220906) have contributed to hybrid vetches in Michigan.

Screening timothy (Phleum pratense) accessions for leaf and stem rust resistance has been terminated. The results of this work are published in the Plant Disease Reporter.

Screening is being continued for crown rust (Puccinia coronata Cda.) on tall oatgrass, Arrhenatherum elatius. This work, now in its third year, has revealed 19 accessions which exhibit tolerance and/or resistance.

High yields and large quantities of aftermath are reported for four clover species; i.e., Trifolium hirtum, T. resupinatum, T. subterraneum, and T. vesiculosum. The University of Kentucky and the Forage and Range Research Branch are continuing to use clover accessions in classification studies.

The 'Arb' perennial peanut, Arachis glabrata (P.I. 118457), is in commercial production in Florida. This perennial legume, requiring vegetative propagation, is being grown successfully on sandy soils in grass-legume combinations involving warm-season sod and bunch grasses.

b. Cereal crops. New Crops Research Branch handled an average of 1,241 cereal crop accessions for the years 1964-66, inclusive. The 999 accessions obtained during 1966 represent a 2% increase in inventoried stocks of the USDA Small Grain Collection. 'Blueboy' wheat, whose parentage includes P.I. 156641 (Japan) was released cooperatively by ARS and the North Carolina Experiment Station. It is short, early, stiff-strawed, high yielding soft wheat with good resistance to soil-borne mosaic virus.

c. Fiber crops. Plant introductions are in the parentage of eight cotton varieties and two breeder lines released during the interim of this report. These are Acala SJ-1 and Acala Imperial (California and ARS); Pima S-3, Pima S-4 (Arizona, New Mexico, Texas, and ARS); Westburn, Lankburn, and Parrott 66 (Oklahoma and ARS); Hancock (Tennessee and ARS).

Thirty-seven introductions representing seven Gossypium species were introduced for Cotton and Cordage Fibers Research Branch.

3. Chemurgic Crops

a. Oilseeds. There were 1,800 acres or more of crambe in 1966. This included acreage in northeastern Montana and adjacent North Dakota, northern California, and southern Indiana. Changes in the wheat program tended to hold crambe acreage down somewhat and field yields were rather low for the most part. Replicated nursery tests were set up at several locations in 1966. Crambe hispanica (P.I. 279346) was two weeks or more earlier maturing than any of the tested C. abyssinica accessions.

If seed retention and resistance to diseases and nematodes could be obtained, Euphorbia lagascae would have excellent new crop potential since the oil content of the seed and the epoxyoleic acid content of the oil are high. Improvements of this nature would likely necessitate an intensive breeding program that would involve the introduction of a much wider range of germ plasm than presently available.

Work on Lesquerella, a potentially valuable oil (hydroxylated fatty acids) and meal protein source, is continuing at a low level. Laboratory germination tests at Fort Collins, Colo., have shown that gibberellic acid treatment of seed greatly enhances germination and that the effect is relatively long lasting. Seed of several species planted in November at Tucson, Ariz., was treated with gibberellic acid. Seed of a few species seems to germinate fairly well without treatment. Much more activity with this genus is needed to determine the potentiality of the better species and to improve them through selection and breeding efforts.

Germination studies with seed of Vernonia anthelmintica, a seed oil source of epoxyoleic acid, have been conducted at Glenn Dale, Md., over the period 1963-66. Seed placed in cold storage soon after harvest does not germinate well even after several months. Such storage seems to interfere with after-ripening. The period of time for after-ripening at room

or air temperatures varies but at least 16 to 18 weeks should be allowed. Seed harvested from frost-killed plants germinates poorly. The stage of seed maturity at harvest affects the rapidity of germination. Under ARS contract, Purdue University grew 733 selection lines in 1966 and over 7,000 individual hand crosses have been made in the greenhouse. Refinements of crossing techniques are being made. Including seed samples from two locations, 224 samples of seed were analyzed for oil, vernolic acid, and free fatty acid content. There apparently was a strong locational effect on the oil content and oil constituents. The samples produced in southern Indiana were, for the most part, better than those grown at Lafayette. Differences were likely magnified by the poor seasonal conditions especially in the Lafayette area.

b. Annual pulp crops. Industrial interest in kenaf (Hibiscus cannabinus L.), as a raw material for pulping, is continuing to rise. There were more than 200 acres of kenaf in 1966 which were sponsored by pulping concerns, and acreage in 1967 is expected to be as high or higher. Interest is also being expressed by foreign pulping concerns. The major problem is the development of suitable and economic methods of harvesting, handling, and storing the raw material. Although some experimental yields were quite high in 1966, more yield data from simulated field conditions are needed. A row-width, plant-population study of several year's duration in North Carolina was completed in 1966. In general, the results show that the best yields are obtained from rows spaced 14 inches apart with 2 to 4 plants per linear foot of row. A Georgia study also indicated that narrow rows (12 or 24 inch) were preferred. Although there was no clear-cut response of kenaf to fertility treatments in a Georgia study, the top (12.3 tons/A) and overall yields (11.1 tons/A) were quite high. Kenaf is well adapted to Georgia especially in the Piedmont and Coastal Plain regions. At Glenn Dale, Md., populations of 40, 80, 120, and 160,000 plants/A and 5 harvest dates were studied. The best yield (6.8 tons/A) was obtained with a population of 80,000 plants and an October 4 (prefrost) harvest. Yields for all populations decreased as harvesting was delayed. The experiment is to be repeated in 1967.

c. Other new crops. Extensive field trials with Tephrosia vogelii, a source of rotenone, were conducted in North Carolina, South Carolina, Maryland, and Georgia. Large plantings in North Carolina and South Carolina were harvested in early October with forage choppers. The chopped material was used in pilot-sized extraction tests. Dry-weight yields of whole chopped plants from these large fields ranged from about 1.25 to 2.9 tons per acre. Yields can probably be increased substantially by modifying cultural practices especially row width and plant population. Experimental plot yields of breeding line 6285 and P.I. 305346 were outstanding at Lewiston, N.C. Eleven lines were evaluated at Rocky Mount, N.C., and these were analyzed for rotenone and deguelin at the Northern Utilization Laboratory. Two lines were found to contain no rotenone. This point emphasizes the importance of having adequate analytical methods for use with the breeding program.

Research efforts on Dioscorea, a source of steroidal drugs, are rapidly being concluded except special areas that require some specific effort. A USDA publication on the cultivation of Dioscorea spp. is being prepared as a guide to prospective producers of the crop. Results from a

Florida study have been summarized in manuscript form. For the three species involved, the percentage of sapogenins increased between the first (30 months) and second (42 months) harvests, but dry-weight tuber yields actually decreased. D. composita yielded the best.

Several accessions of Brassica campestris and two of B. hirta are being evaluated as possible sources of high erucic acid oil. Although some seed increase has been obtained, little is known about their agronomic potential.

Seed of several species of Solanum from Colombia and one from India was planted in Georgia and Puerto Rico. The latter planting was essentially unsuccessful. Good seed increases of S. atropurpureum, S. khasianum, and S. mammosum were obtained in Georgia. These, plus S. aviculare, will be reevaluated in 1967, and the fruit may be analyzed to determine the solasodine (steroid) content.

The seed oil from Satureja hortensis (P.I. 226649) is similar to flax seed oil. A study of this species was conducted with field experiments at Wawawai, Wash., in 1966. Approximately 1,140 pounds of seed were obtained from 1.2 acres. The plant is indeterminate in flowering but holds its seed well. Further field testing has been recommended to determine areas of adaptability and yield potentials.

C. Tropical Research in Puerto Rico

The Feceral Experiment Station in Mayaguez, Puerto Rico, serves as the tropical research center for the Agricultural Research Service. The station conducts research with tropical plants of importance to the United States, and serves as a center for acquiring and evaluating new plant material of potential value in United States agriculture. The tropical location provides facilities for large-scale winter season testing of new breeding lines and varieties, and permits rapid seed increase of new genotypes developed at plant breeding stations in the United States. Through these procedures a tropical environment is used to reinforce and extend Departmental research programs in the United States. In some types of investigations such as sorghum breeding and selection, and screening breeding lines or varieties for disease resistance, this tropical research facility, in conjunction with Departmental activities in the States, permits completion of work in each calendar year which would otherwise require two years.

Investigations with sorghum, tobacco, sugarcane, soybeans, cereals, and Dioscorea are cooperative with Departmental research units located in the United States. Contributed funds from industrial sources support vanilla, cacao, and black pepper investigations. The Mayaguez Station cooperates closely with the Agricultural Experiment Stations of the University of Puerto Rico in conducting research for development of drug, insecticidal, spice, and other specialty crops of interest to agriculture in Puerto Rico. In addition to Crops Research Division activities, the Soil and Water Conservation Service also has offices at the Federal Experiment Station in Mayaguez.

In Puerto Rico, the tropical research program utilized 6.5 professional man-years, distributed as follows: insecticidal crops 1.1; drug crops 1.1; plant introduction, distribution, and testing 0.8; spice and cereal crops 1.0; plant diseases 1.7; and winter-season breeding and seed-increase 0.8.

1. Insecticidal Crops. Improved methods were developed for quantitative analysis of rotenoids in leaf extracts of Tephrosia vogelii. In thin-layer chromatography plates prepared with silver nitrate-treated silica gel, a small amount of fluorescein on the plate causes rotenone and deguelin to fluoresce. Without fluorescein, the fluorescence is extinguished in the presence of silver nitrate. Tephrosin, although it does not fluoresce under these conditions, can be located under ordinary light. A new colorimetric method of analysis was developed, based upon a blue reaction which occurs when rotenone is treated with certain phenolic compounds. The procedure eliminates some problems encountered when the conventional red color test is used in conjunction with thin layer chromatography.

Preliminary data suggest that higher rotenoid yields can be obtained if T. vogelii plants are harvested two or more times by clipping the plants, permitting new growth to develop, and repeating the harvest. Plants clipped at heights of 18 inches or more have given good regrowth, but when clipped at lower heights they have not recovered satisfactorily.

2. Drug Crops. Plantings of Dioscorea composita and D. floribunda were harvested from 3 widely separated locations with distinct climatic conditions. Although yield differences were strongly affected by locations, this test supported previous indications that these species can be grown satisfactorily under widely different conditions. Best yields of both species occurred on well drained coastal clay loam, in an area of moderate rainfall. D. composita grew well in heavy clay soils and in wet areas to elevations of 2,200 feet, the highest location used. The performance of D. floribunda was more erratic under these conditions.

First data from an herbicide experiment, which includes several compounds not previously tested, indicate that some treatments have produced negligible crop injury, while providing good control of weeds.

Further efforts to develop a satisfactory indexing method for virus diseases of Dioscorea species did not reveal a fully reliable procedure. Of many species tested, Capsicum annuum remains the best indicator species. Three varieties appear equally satisfactory as index plants, but all require several weeks to produce symptoms and none gives the reliability desired.

3. Plant Introduction, Distribution, and Testing. The permanent cacao collection was increased by addition of new clones from various countries. The collection now contains 163 clones established in field plantings and 58 additional clones recently established in isolation greenhouses for virus indexing.

The search for new systems of cytoplasmic male sterility in Lycopersicon esculentum has been impeded by the strong unilateral incompatibility of the bridge species, L. hirsutum, now carrying S, pennellii cytoplasm, where crossed as male to L. esculentum. Although this barrier can probably be broken, some first steps have been taken to avoid the problem with an "inverted" system, in which the same genetic elements are present, but are combined in an unconventional way.

Three different mechanisms have been identified which impede reproduction of the sweet potato. In some crosses studied, embryo abortion after fertilization is an effective reproductive barrier, in addition to pollen germination failure on the stigma, and failure of pollen tubes to enter stylar tissue. In studies with other Ipomoea species four incompatibility groups were found in I. setifera and five in I. acuminata.

A cooperative sweet potato program was continued, in which plants from Tifton, Georgia, were grown to maturity for seed production in the winter season. Seeds produced in Puerto Rico were returned to the States for use in variety development programs at various locations.

4. Spice and Special Crops. Vanilla planifolia introductions from Mexico which were not infected when inoculated with Fusarium oxysporum in the greenhouse, were moved to field plantings for further disease resistance studies. Some plants classified as resistant in the preliminary tests immediately developed infections under field conditions. However, many remain uninfected in a field location where the disease organism is prevalent. These results suggest that this group of plants includes some which are resistant to the Fusarium organism.

Procedures were improved for inducing parthenocarpic fruit set of vanilla fruits. Repeated hormone applications have proved necessary to achieve maximum fruit development. Spray treatments with aqueous solutions were less satisfactory than treatments using lanolin paste as a carrier. Preliminary tests indicate that parthenocarpic fruits cure satisfactorily by conventional methods and that they possess the aromatic components found in seed-bearing fruits.

In a field experiment, black pepper failed to grow satisfactorily on rootstocks of Piper scabrum, P. trelesianum, and P. aduncum. Although these scion/stock combinations grow well in the protected environment of greenhouses, none proved vigorous under outdoor conditions. Several black pepper plants have been located which have survived for many years without showing any symptoms of Phytophthora root disease. These have been established for evaluation under controlled conditions.

5. Plant Diseases. In cooperative oat and wheat rust nurseries planting locations, procedures and objectives were the same as in previous years. Separate nurseries were planted for testing reactions to three single races and one mixed race of wheat stem rust, and three single races of oat crown rust. Artificial lighting was used to provide long-day growing conditions to induce heading of Avena sterilis. This permitted satisfactory testing of a large number of new introductions of interest as

sources of adult rust resistance. From 1,480 A. sterilis entries, 43 showed adult resistance in these nurseries, and were selected as likely sources of new genes for rust resistance.

6. Winter testing and seed increase. Soybean variety yields were compared in May, June, and July plantings. The variety Clark and a breeding line selected by Oilseed and Industrial Crops Research Branch gave high yields in all plantings. Yields of Hill and Hardee were satisfactory when planted in May but much lower in later plantings. Improved Pelican gave lowest yields in all cases.

A winter planting of 53 tomato breeding lines was grown for selection of F_2 and F_3 seeds. Selections from the planting in Puerto Rico were sent to Beltsville for use in the summer breeding program.

From a winter planting of 49 cantaloupe breeding lines selections were made for local use and for use in further breeding investigations at Beltsville. Several selections which showed highest leaf disease resistance have been replanted at Mayaguez for further selection.

A group of 2,315 sorghum lines in the world collection were grown for seed increase. In the sorghum conversion program, 414 F_3 selections were grown for backcrossing to the recurrent parent, and 599 lines were crossed to Tx A 3197 to test for B- or R- reactions to the kafir-milo cytoplasmic male sterility system. Necessary data were recorded to complete the collection of descriptive information covering all alien lines in the world collection. A group of 363 F_1 populations was grown to increase seed supplies for summer plantings in the States.

Seed increase plantings of various species were grown in the winter season for New Crops Research Branch and other Branches of Crops Research Division.

APPENDIX C

1967 Revision of Project S-9

REGIONAL RESEARCH PROJECT S-9

Cooperative among
THE STATE AGRICULTURAL EXPERIMENT STATIONS
of the
SOUTHERN REGION,
the
CROPS RESEARCH DIVISION and UTILIZATION RESEARCH AND DEVELOPMENT DIVISIONS
of the
AGRICULTURAL RESEARCH SERVICE,
and
SOIL CONSERVATION SERVICE
of the
UNITED STATES DEPARTMENT OF AGRICULTURE

I. DATES

1. Initiated July 1949
2. Revised March 1955
3. Revised August 1962
4. This revision prepared March 1967

II. TITLE

S-9 "New Plants" - The Introduction, Multiplication, Evaluation and Preservation of New Plants for Agricultural, Industrial and Urban-Rural Uses.

III. JUSTIFICATION

With few exceptions our established crops are of foreign origin. Although we lead the world in agricultural production, growers continue to demand varieties that will further increase efficiency of production and consumers ask for even better quality products. A great diversity of germplasm is needed by plant scientists to develop varieties that will meet these ever increasing demands of the producer and consumer. Centers of origin of these crops have proven to be the richest sources of germplasm for their further improvement. The introduction and exchange of breeding lines and varieties from other countries have also been important sources of valuable germplasm.

There are also continuing and urgent needs for the introduction, evaluation, and development of plants which would be useful in agricultural diversification, including crops for new uses in industry. The increase in urban population and planned sub-divisions, greater pride in home ownership and beautification, and changes in architecture have increased the need for new ornamental plants. Development of parks, industrial sites, and roadside plantings have further increased this need.

The Research and Marketing Act of 1946, Public Law 733, especially emphasizes the introduction and evaluation of plants for potential industrial end uses. Researchers and studies on industrial uses were further stimulated in 1957 by the report of the President's Commission on the Increased Uses of Agricultural Products. One section of this report related especially to New and Special Crops and outlined six interrelated steps involved in a comprehensive program of location, characterizing, producing and utilizing plants having potential industrial values.

Plants of potential value are obtained by the New Crops Research Branch, Crops Research Division of the Agricultural Research Service, USDA, through foreign expeditions, exchanges, and Public Law 480 contracts. This Branch maintains four plant introduction and testing stations which are located at Glenn Dale, Maryland; Savannah, Georgia; Miami, Florida; and Chico, California. The station at Glenn Dale is used for propagating woody ornamentals and fruit plants, cultural studies of potential chemurgic crops, and for holding certain materials in quarantine until they are cleared for distribution. Work at the other three federal stations is concentrated on the study of special problems of a limited number of species. Under the Research and Marketing Act of 1946 funds were made available to establish a cooperative federal-state program for the introduction and evaluation of plants for agricultural and industrial uses and for the preservation of germplasm. For convenience in coordinating this program the United States was divided into 4 regions - Northeastern, Northcentral, Southern and Western - each having a state-federal cooperative project with a regional plant introduction station. Regional stations are located at Geneva, New York; Ames, Iowa; Experiment, Georgia; and Pullman, Washington.

Ten of the southern state agricultural experiment stations participate under formal contributing projects with the Regional Plant Introduction Station in testing and evaluation of new germplasm. The other four states participate in the project on an informal basis. Since establishment of the Southern Regional Station in 1949, the states have tested over 100,000 seed lots selected from the 29,000 introductions received to date. Numerous reports from cooperating states have shown that only through wide distribution and evaluation can characters such as growth responses, disease resistance, winter hardiness, drought tolerance, chemical composition, and others of economic value be revealed.

This revision provides an opportunity for documenting the accomplishments of the S-9 project and for rewriting the project outline in accordance with the new procedures for preparation of regional project outlines as set forth in CSRS-OD-1082, USDA, Manual of Procedures for Cooperative Regional Research, U.S. Department of Agriculture, November 1963.

IV. PREVIOUS WORK AND PRESENT STATUS

At least 123 new improved varieties known to contain introduced germplasm have been released in the Southern Region since the S-9 "New Plants" Project was initiated. New sources of disease and insect resistance, drought tolerance, and other characters desired for crop improvement have been discovered in more recent introductions. At least seventy-one introductions are known to be in advanced breeding lines at the several state stations. Some of these will probably be released in the near future as new varieties or as parents for hybrids.

In recent years effort has been concentrated on the evaluation of plants that produce unusual oils, gums, fibers, and other products not presently available in commerce. The New Crops Research Branch in its investigation of plant resources of the world has provided chemists and plant scientists with an abundance of plants representing a wide diversity of materials in the plant kingdom. Results from chemical analyses by the Utilization Research and Development Divisions of ARS show that many of these plants, some of which have never been grown under cultivation, contain unusual but potentially valuable oils, waxes, gums, fibers, and products of pharmaceutical uses. Also some of these plants are potentially valuable sources of proteins. Approximately 90 species that appeared promising from the standpoint of chemical composition have entered the regional testing program to determine their adaptability to the Southern Region.

Crambe abyssinica, through cooperative work in this region and others, is now under commercial production in North Dakota as a source of oil used in the steel and plastics industries. Further studies of Crambe are being made in Texas to determine the possibility of growing it as a winter crop. A few other species have shown considerable promise as potential new crops for industrial utilization. Among them are Brassica carinata, which produces a seed oil similar to that of Crambe; Hibiscus cannabinus (kenaf) and Crotalaria juncea (sunn hemp), both of which show promise as annual paper pulp crops. Paper manufacturers have shown much interest in kenaf and sunn hemp as sources of raw material. With their support these plants may finally be brought through the "awkward" stage of development as new crops.

Two regional bulletins summarizing the progress made under Project S-9 have been published. Southern Cooperative Series Bulletin 27, entitled "Progress and Potentials in Plant Introductions for the South", was published as a five-year report on progress in 1955. Southern Cooperative Series Bulletin 79, entitled "New Plants for the South", was published in 1961 as a ten-year report. Another regional bulletin which summarizes the evaluation and use of plant introductions in the South during the five year period 1961-1966 is under preparation. These and other publications resulting from the evaluation and use of plant introductions in the Southern Region are listed in the appendix.

V. OBJECTIVES

1. To participate in the coordinated program of foreign and domestic plant exploration and introduction to obtain new plants for agricultural, industrial, and other uses.

2. To multiply, evaluate, maintain and preserve germplasm of introduced plant materials for the Southern Region.

3. To provide plant and seed materials for assessments of their chemical and physical properties and to determine cultural requirements of species having industrial use potential.

4. To catalogue and distribute introduced plant materials and to maintain and publish records of their performance and use in the Southern Region.

VI. PROCEDURES

1. Explorations and Introductions

The New Crops Research Branch of the Crops Research Division, ARS, has the major responsibility for this objective. It officially conducts both foreign and domestic plant explorations. New plant materials desired and areas to be explored are recommended by the S-9 committee to the New Crops Research Branch where they are summarized and coordinated with other requests. The New Crops Research Branch formulates plans for explorations and presents them to the National Coordinating Committee for consideration. Crop specialists from state experiment stations may participate in foreign and domestic explorations when feasible.

It is recommended that individuals and other agencies making plant collections utilize the identification, inspection, and quarantine facilities of the New Crops Research Branch; and that plant materials obtained in this manner be catalogued and tested in the same manner as plant material obtained through the regular procedure by the Department of Agriculture.

Requests for special domestic or foreign explorations should be presented to the executive committee for the S-9 regional project. Two or more states must show an interest in the proposed exploration before it will be considered for approval by the technical committee. If approved, the proposal will be submitted to the New Crops Research Branch.

Individual requests for a small number of specific items should be referred to the coordinator of Regional Project S-9.

National Coordination

Regional Project S-9 coordinates its program at the national level through the National Coordinating Committee which functions in accordance with Section 5.4 of the Manual of Procedures for Cooperative Regional Research, U.S. Department of Agriculture Publication CSRS-OD-1082.

2. Preliminary Evaluation, Multiplication and Maintenance of Materials

The Southern Regional Plant Introduction Station at the Georgia Experiment Station, Experiment, Georgia, is responsible for this phase of Objective 2. It is the receiving center for introduced seed or vegetative stocks of new plants coming into the region. It is responsible for their propagation, evaluation, and maintenance to insure against loss of the materials. Propagation and preliminary evaluation of most stocks will be undertaken through facilities and personnel of the regional station. However, when introductions are better adapted to other states because of climate, interest, or specializing personnel, arrangements may be made by the regional station with cooperating state experiment stations for their increase and evaluation. All materials that are propagated successfully will be maintained at the regional station for use by plant scientists in the region and by those in other regions when requested.

Advanced Evaluation and Use

Further evaluation of new plant materials to determine their potential value is the responsibility of all participating states and the Soil Conservation Service. All plant introductions maintained at the regional station will be available for transfer to plant scientists at state stations who have a need for them. Evaluations made at state stations will involve many disciplines, but the greatest effort will be directed toward locating superior germplasm useful in plant breeding. Germplasm that will be searched for includes genes for higher yield, superior quality, resistance to insects and diseases, and other genetic characters that lead to more efficient production of higher quality products. Certain species will be evaluated to determine their use for conservation of soil, water, and wildlife. Ornamental species will be evaluated for specific uses in landscaping homes, industrial sites, parks, and other public areas. Some introductions will be used in basic genetic studies and as tester plants in studies of crop pests.

Germplasm Preservation

The preservation of valuable germplasm of economic plants in the Southern Region will be closely integrated with similar programs in the other three regions and with that of the National Seed Storage Laboratory. A central seed storage room equipped with temperature and humidity controls is maintained at the regional station, wherein seed of all introductions entering the S-9 regional program are held in viable condition as working stocks. The Regional Station will cooperate with the National Seed Storage Laboratory by placing reserve stocks of valuable introductions at the laboratory for long-term storage. Plant breeders and others will be encouraged to store reserve seed supplies of established varieties and valuable breeding lines in the National Seed Storage Laboratory to insure preservation of these stocks.

3. Chemical and Cultural Studies of New Plants for Industry

The Northern Utilization Research & Development Division; the New Crops Research Branch; the Regional Station; and experiment stations in Arkansas, Florida, Georgia, North Carolina, Oklahoma, Puerto Rico, South Carolina, and Texas will be responsible for Objective 3. The Northern Utilization Research & Development Division will determine the chemical and physical properties of a wide array of plant and seed materials, which may possess unique components of value to industry. These materials will be provided by the New Crops Research Branch and state experiment stations listed above. As analyses indicate plant species that have components of potential value, such information will be supplied to the New Crops Research Branch and the S-9 technical committee. This information will be used as a basis to determine which species merit field evaluation.

Materials to be evaluated in the Southern Region will be forwarded to the regional station for seed increase and preliminary evaluation. The industrial crops subcommittee will determine and recommend to the S-9 Technical Committee which plants merit further cultural studies and the types and extent of such studies. The S-9 Technical Committee, at its annual meetings, will assign responsibility for each study to specific states.

4. Distribution and Records

The Regional Station will be responsible for this phase of work. Inventories of available plant introductions will be prepared annually by personnel at the regional station. These lists will be distributed within the region through the technical committee to agronomists, horticulturists, and other plant scientists interested in testing and using the new materials. They will be distributed to research workers in the other three regions through the regional coordinators. These lists contain the source, descriptions, and records of performance of available plant introductions.

Seeds or vegetative stocks of all accessions on the seed lists will be available to research workers with the restriction that the P.I. number be acknowledged as the source of the plant material. It is also the obligation of individuals receiving introductions to report their performance and use to their technical committee member or to the regional coordinator. In accordance with the policy statement of the National Coordinating Committee, approved February 28, 1950, no seeds or plant materials shall be distributed to any private agency for exclusive use.

Evaluation reports on the performance and use of introductions within the region will be maintained by the regional station. Information about valuable or promising accessions will be summarized and disseminated through annual reports, minutes of technical committee meetings, and seed lists. Cooperators who contribute to the reports will receive full credit in these summaries.

Publications

Results from studies in this project are to be published by the State Agricultural Experiment Stations and/or federal agencies involved. State and regional publications are to be in accord with the directives as stated in the Manual of Procedures for Cooperative Regional Research (CSRS-OD-1082).

VII. COOPERATING AGENCIES

1. State Agricultural Experiment Stations as follows:

Alabama	North Carolina
Arkansas	Oklahoma
Florida	Commonwealth of Puerto Rico
Georgia	South Carolina
Kentucky	Tennessee
Louisiana	Texas
Mississippi	Virginia

2. Federal agencies as follows:

Crops Research Division, ARS
Northern Research and Development Division, ARS
Soil Conservation Service
Cooperative State Research Service

VIII. ORGANIZATION

Membership of Technical Committee

A regional technical committee is responsible for the technical guidance of this project. The committee consists of an administrative advisor selected by experiment station directors in the Southern Region, the coordinator of the Southern Regional New Plants Project, at least one technical representative from each of the cooperating states, and a representative of each of the following federal agencies: Crops Research Division, ARS; Northern Utilization Research and Development Division, ARS; Soil Conservation Service; and the Cooperative State Research Service.

Function of Individual Committee Members

The S-9 project is organized to serve the interest of practically all groups of plant scientists in each of the state stations of the Southern Region. Consequently, each state should be represented by a committee member, who, encouraged by his director, can and does accept the opportunity and responsibility of keeping all interested plant scientists in his station informed of the availability and methods of evaluation and utilization of plant materials which are being introduced through the Southern Regional Plant Introduction Station at Experiment, Georgia. This station in turn has access to all plant materials introduced into the other three regions through the Crops Research Division programs of ARS.

The committee member from each state station can serve effectively as a liaison and local coordinator of "New Plants" activities. It is his responsibility to summarize annually the progress of new plants research in his state and report it to the technical committee and regional coordinator. The S-9 project is most effective where the state representative is concerned with the needs and use of the available plant materials by all interested scientists within his state.

General Functions of Technical Committee

The technical committee elects a chairman who convenes a meeting with the approval of the administrative advisor once each year or as often as the progress of the project requires. The committee formulates general plans for conducting the research program and designates portions of the program to be conducted by each of the cooperators within the region to assure the most effective use of available resources. The committee makes budget recommendations relative to the needs for funds and facilities for the research program. In addition, it reviews and evaluates the accomplishments of this regional program periodically and makes suggestions for the revision of the project outline as seems desirable during the progress of the work. An annual report on the progress of work is prepared by the committee chairman and the coordinator. Travel expenses for members of the technical committee to attend approved meetings of the committee are paid by the respective states or agencies.

Executive Committee

The executive committee of the S-9 Technical Committee consists of the administrative advisor, chairman of the technical committee, immediate past chariman of the technical committee, secretary of the technical committee, and the

coordinator. They serve as representatives of the region on the National Coordinating Committee, which coordinates new plants research at the national level. The executive committee also acts on matters that require attention between regular meetings of the technical committee.

Coordinator

A coordinator is employed by the New Crops Research Branch, Crops Research Division, ARS. He is directly responsible for the propagation, evaluation, distribution, and maintenance of introductions received in the region, either through facilities of the regional station or through arrangements with participating states or agencies. The coordinator and other professional staff of the regional station shall undertake research with specific plant introductions to promote their acceptance as breeding stocks by cooperating states and other agencies. Visits, annually or more often as conditions justify, are made to the cooperating states or agencies to advise cooperators on developments in the introduction program and to determine the performance of introductions in the states. On the basis of information obtained through such visits, and through reports by cooperators, the coordinator prepares reports on outstanding developments in evaluation work and potential uses of new plant materials. To be of greater service to the region, he meets with various crop interest groups which use introductions in their programs. The coordinator maintains records of all introductions used in the region and prepares and distributes to all cooperators catalogues of introductions as they are currently increased and evaluated. Each region has a similar project and all are integrated by the National Coordinating Committee for the New Crops Program.

IX. TERMINATION

June 30, 1972 (with expectation of revision and continuation).

X. SIGNATURES

Date	Administrative Advisor
Date	Chairman, Southern Directors
Date	Chairman, Committee of Nine
Date	Cooperative State Research Service

XI. ATTACHMENTS

Project Leaders and Area of Specialization

Alabama

C. S. Hoveland - Evaluation of forage crop introductions and coordination of new plants research activities in Alabama.

Arkansas

J. L. Bowers - Evaluation of Cucumis and Vigna introductions and coordination of new plants research activities in Arkansas.

Florida

G. B. Killinger - Evaluation of new plants for forage, cultural studies of chemurgic plants, and coordination of new plants research activities in Florida.

Georgia

W. L. Corley - Evaluation of introduced breeding stocks of horticultural crops.

J. H. Massey - Cultural studies of new plants for production of oil, gums, drugs and insecticides.

D. G. Cummins - Evaluation of new plants for pulp, fiber, and forage production.

George Tereshkovich - Evaluation of new ornamental plants and coordination of new plants research activities in Georgia.

Kentucky

N. L. Taylor - Evaluation of Trifolium introductions and coordination of new plants research activities in Kentucky.

Louisiana

E. N. O'Rourke - Evaluation of pome fruit introductions and coordination of new plants research activities in Louisiana.

Mississippi

H. W. Bennett - Evaluation of Paspalum and forage sorghum introductions and coordination of new plants research activities in Mississippi.

North Carolina

W. T. Fike - Cultural studies of new chemurgic plants and coordination of new plants research activities in North Carolina.

Oklahoma

R. S. Matlock - Evaluation of peanut introductions, cultural studies of new crops for industry and coordination of new plants research activities in Oklahoma.

Puerto Rico

J. Velez-Fortuno - Evaluation of Cajanus and tropical forage spp., and coordination of new plants research activities in Puerto Rico.

South Carolina

J. A. Martin - Cultural studies of new and special crops and coordination of new plants research activities in South Carolina.

Tennessee

W. E. Roever - Evaluation of small fruit plants and coordination of new plants research activities in Tennessee.

Texas

E. L. Whiteley - Cultural studies of new chemurgic plants and coordination of new plants research activities in Texas.

Virginia

T. Jackson Smith - Evaluation of alfalfa introductions and coordination of new plants research activities in Virginia.

New Crops Research Branch, CRD, ARS, USDA

H. L. Hyland - Introduction, sanitary inspection, and inventory of new plant materials.

A. J. Oakes - Evaluation and maintenance of agronomic plant introductions.

H. F. Winters - Evaluation and maintenance of horticultural crop introductions.

G. A. White - Cultural evaluation and maintenance of new chemurgic plants.

Northern Utilization Research & Development Division, ARS, USDA

I. A. Wolff - Chemical and physical evaluation of new plant materials

Soil Conservation Service, USDA

W. C. Young - Evaluation of new plants for conservation of soil, water, and wildlife.

Southern Regional Plant Introduction Station

W. R. Langford - Multiplication, preliminary evaluation, and cataloguing new plants, preservation of working stocks and coordination of new plants research activities at the regional level.

Grover Sowell, Jr. - Evaluation of new plants for resistance to diseases.

Critical Review

Progress has been made toward achieving all 4 objectives of Regional Project S-9. However, the objectives are of a continuing nature because of the germplasm needs of plant scientists to meet the ever changing demands of the grower, processor, and consumer. The major accomplishments under each objective and areas needing further investigation are summarized below.

1. Plant Exploration and Introduction: Procurement of new plants is largely the responsibility of the New Crops Research Branch, while the regional station is the receiving center of plant materials to be maintained and evaluated in the South. During the last five years 9927 new accessions were received by the regional station. Many of them were obtained by foreign explorations and through P.L. 480 contracts under the leadership of the New Crops Research Branch. Some were obtained from state station personnel who made foreign explorations to collect specific materials for their use but shared their collections with Project S-9. Another source of plant materials was from domestic explorations in the southern region. Some of the major germplasm collections obtained since 1962 include 900 accessions of peanuts from Rhodesia, 400 accessions of Digitaria spp. from the Republic of South Africa, 1300 old world bluestems, and 400 introductions of Cynodon spp. from Africa and Asia.

   Since the beginning of this project in 1945 the regional station has accumulated more than 17,000 seed lots or vegetative clones representing 140 plant genera and 850 species. In this reservoir of germplasm there are about 2000 accessions of peanuts, 2000 sorghums, 1500 peppers, 1300 cantaloupes, and sizeable collections of other southern crops.

   These collections should be maintained not only as a source of known genes, but also as a source of genes not yet needed or known to exist. Moreover, the collections should be enlarged by further plant exploration and introduction to obtain the greatest range of genetic diversity of each crop species.

2. Multiplication, Evaluation, and Preservation of Germplasm: Approximately 3000 accessions have been grown annually at the regional station for seed increase and for preliminary evaluation of agronomic and horticultural characters and disease reactions. In disease screening studies at the regional station sources of resistance to bacterial spot of pepper, two viruses of southern peas, gummy-stem-blight of cantaloupe, and anthracnose of sorghum were found. Some materials, because of climate or specializing personnel have been propagated and evaluated on a preliminary basis at stations in Puerto Rico, Texas, Oklahoma, South Carolina, and Kentucky. All of the materials that were propagated successfully were made available to plant scientists at state stations and the Soil Conservation Service for further evaluation. Although these materials have been supplied through Regional Project S-9, many of the evaluations and use of the germplasm as breeding stocks were accomplished under other projects not formally associated with S-9. As a result of these advanced evaluations a few superior introductions were increased and released as new varieties without any modification by breeding. A number of others were used as breeding stocks in the development of new varieties released in recent years or to be released in the near future.

Some examples of crop varieties and breeding lines that resulted entirely or in part from plant introductions in the Southern Region follow:

	P.I. No.	Origin
Amclo clover	234310	Italy
Meechee arrowleaf clover	233782	Italy
Yuchi arrowleaf clover	233816	Italy
Frontier crimson clover	233812	Italy
Abon Persian clover	(143496	Iran
	(143497	Iran
	(141500	Iran
	(141501	Iran
	(141502	Iran
	(173974	India
	(180492	India
Israel sweetclover	200355	Israel
Gulf ryegrass	193145	Uruguay
Magnolia ryegrass	(193145	Uruguay
	(194394	Uruguay
	(194395	Uruguay
	(201980	Uruguay
Suhi-1 sudangrass	156549	Rhodesia
Sunturf bermudagrass	184339	S. Africa
Borre lupine	189191	Sweden
Blanco lupine	189191	Sweden
Rancher lupine	168535	Portugal
Vetch P.I. 121275 (source of hard seed character used in breeding reseeding vetch)	121275	Turkey
Sorghum verticilliflorum	267328	India
Premier sideoats gramma	216244	Mexico
Sorghum P.I. 221688 (source of yellow endosperm in sorghum breeding)	221688	Nigeria
Sart sorghum	152945	Kenya
Wiley sorghum	(152694	Kenya
	(155819	Nyasaland
NC-5 peanut	121067	Brazil
Florigiant peanut	P.I. No. lost	Gambia Africa
Arb peanut	118457	Brazil
Argentine peanut	121070	Argentina
Cherokee alfalfa	158837	France
Mills guar	263875	India
Hall guar	179930	India

	P.I. No.	Origin
Starr peanut	161317	Argentina
TSP1OR Castorbean	246332	Brazil
Floridew cantaloupe	223637	Iran
Seminole cantaloupe	124112	India
Cantaloupe P.I. 140471 (used as a source of resistance to gummy-stem-blight in cantaloupe breeding)	140471	Texas
Cantaloupe P.I. 236355 (used as a source of bacterial wilt resistance in cantaloupe breeding)	236355	Gr. Britain
Gold Coast okra	186972	Gold Coast
Canbake sweet potato	129655	Australia
Georgia Red sweet potato	132056	Puerto Rico
Goldrush sweet potato	47433	Puerto Rico
Acadian sweet potato	47433	Puerto Rico
Earlyport sweet potato	47433	Puerto Rico
Centennial sweet potato	PI No. lost	Puerto Rico
Nugget sweet potato	153655	Tinian Island
Gem sweet potato	153655	Tinian Island
Red Gold sweet potato	47432	Puerto Rico
Tanhoma sweet potato	129655	Australia
NemaGold sweet potato	47432	Puerto Rico
CaraGold sweet potato	PI No. lost	
Red LaSoda irish potato	(12646	Austria
	(33473	Austria
	(38357	U.S.S.R.
Polaris cucumber	197087	India
Pixie cucumber	197087	India
Poinsett cucumber	(197087	India
	(220860	Korea
SC-59 cucumber	(196289	India
	(197087	India
	(220860	Korea
Manalucie tomato)		
Manapal tomato)	79532	Peru
Florilou tomato)	126445	Peru
Indian River tomato)		
Marion tomato	79532	Peru
Summer cherry tomato	190256	New Calendonia

	P.I. No.	Origin
Valmaine lettuce	167150	
Cavalier nectarine	43146	New Zealand
Red Chief nectarine	43146	New Zealand
Washington peach	55813	France
Flordahome peach	146130	California
Moreton Bay fig	183874	Florida
Australian wax plant	190391	Florida
Quercus acutissima (ornamental oak)	168939	Asia
Watermelon P.I. 142449 (used as a source of resistance to Anthracnose and Fusarium in watermelon breeding)	142449	S. Africa
Pepper (found to be resistant to Puerto Rican strain of pepper mosaic virus)	P. R. PI 6256	US Virgin Is.
Pepper (found to be resistant to Puerto Rican strain of pepper mosaic virus)	P. R. PI 6228	Surinam
Topset cowpea	189416	Guatemala

As stated above the regional station has accumulated more than 17,000 accessions representing 140 plant genera. Working stocks of these are maintained at a temperature of 45°F. with 40 to 45 percent relative humidity. A small portion of this material has been deposited in the National Seed Storage Laboratory for permanent storage, but the demand for seed by plant scientists has delayed placing of stocks in NSSL as rapidly as desirable. As a safeguard against loss by fire or other hazards small seed samples of each item are now being placed in the NSSL as a temporary measure until larger samples can be deposited there for permanent storage.

3. Development of New Crops for Industry: The Northern Utilization Research and Development Division of ARS has assayed a wide array of plant materials representing many families, genera, and species in search of new seed oils, gums, and other components of value to industry. At least 90 species that were found to contain useful constituents were forwarded to the regional station for seed increase and preliminary evaluation. The most promising species have been evaluated at stations in Arkansas, Florida, Georgia, Louisiana, North Carolina, Oklahoma, South Carolina, and Texas. A few have shown some potential for becoming new crops, but further studies are needed to determine specific cultural practices and harvesting procedures. Others will require modification of plant type by breeding. Species that have shown the most promise, their useful components, and major problems yet to be solved are listed below:

Plant	Useful component	Major problems
Kenaf (Hibiscus cannabinus)	Pulp	Harvesting, handling, and storage
Cassia occidentalis	Seed gum	Dark seed gum, poisonous constituent in seed, and diseases
Brassica carinata	Seed oil	Need higher erucic acid content
Crambe abyssinica	Seed oil	Need productive, winter-hardy types
Tephrosia vogelii	Rotenoid	Need higher rotenoid content and improved seed production
Crotalaria juncea	Pulp	Need firm yield data, harvesting, handling and storage

4. Cataloguing and Distribution of Plants and Maintenance of Records: A catalogue of plant materials held at the regional station has been prepared annually and distributed through the S-9 committee and other regional stations to plant scientists in all 50 states. In exchange, seed lists were received from the other three stations for distribution in the Southern Region. Materials held at any of the 4 regional stations have been readily available to plant scientists in all 50 states and the Commonwealth of Puerto Rico.

The regional station, with assistance of the S-9 committee, has maintained a record of the performance and use of introduced plant materials distributed in the South. Two Southern Cooperative Series Bulletins reporting the progress made with plant introductions have been published. A third such bulletin covering the five-year period 1961-1966 is under preparation.

Following is a list of all known publications relative to the performance and use of plant introductions in this region since initiating this project in 1949:

Regional Station

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3. Corley, W. L. 1966. Georgia's domestic fruit exploration. Ga. Agr. Res. 8(1).

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